DOCUMENT RESUME

ED 107 968 CE 004 181

AUTHOR	McGee, Patricia; And Others
TITLE	An Analysis of the Laboratory Assisting Occupation.
INSTITUTION	Ohio State Dept. of Education, Columbus. Div. of Vocational Education.; Ohio State Univ., Columbus. Trade and Industrial Education Instructional Materials Lab.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C.
PUB DATE	[75]
NOTE	246p.; For related documents, see CE 004 160-180, CE 004 182-206, CE 004 263-268, and CE 004 425-427
EDRS PRICE	MF-$0.76 HC-$12.05 PLUS POSTAGE
DESCRIPTORS	Communication Skills; *Job Analysis; Knowledge Level; *Medical Laboratory Assistants; *Medical Technologists; *Occupational Information; Safety; Skill Analysis; Skill Development; Skilled Occupations; Subprofessionals; *Task Analysis; Task Performance; Work Attitudes

ABSTRACT

The general purpose of the occupational analysis is to provide workable, basic information dealing with the many and varied duties performed in the laboratory assistant occupation. The document opens with a brief introduction followed by a job description. The bulk of the document is presented in table form. Eleven duties are broken down into a number of tasks and for each task a two-page table is presented, showing on the first page: tools, equipment, materials, objects acted upon; performance knowledge (related also to decisions, cues and errors); safety--hazard; and on the second page: science; math--number systems; and communications (performance modes, examples, and skills and concepts). The duties include: performing laboratory techniques, hematology tests, clinical chemistry tests, urinalysis, bacteriology procedures, blood bank and serology procedures, histology procedures, and EKG; operating laboratory equipment; utilizing communication skills; and collecting blood. (BP)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED107968

Occupational Analysis

CE 004 181

LABORATORY ASSISTANT

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Instructional Materials Laboratory
Trade and Industrial Education
The Ohio State University

5239

AN ANALYSIS OF THE LABORATORY ASSISTING OCCUPATION

Developed By

Patricia McGee
Instructor, Lab Assisting
Eastland J.V.S.
Columbus, Ohio

Ronald L. Moore
Instructor, Lab Assisting
Eastland J.V.S.
Columbus, Ohio

Gordon E. Pickett
Consultant
Batelle Memorial Institute
Columbus, Ohio

Occupational Analysis
E.P.D.A. Sub Project 73402
June 1, 1973 to December 30, 1974
Director: Tom L. Hindes
Coordinator: William L. Ashley

The Instructional Materials Laboratory
Trade and Industrial Education
The Ohio State University

"The activity which is the subject of this report was supported in whole or in part by the U.S. Office of Education, Department of Health, Education, and Welfare. However, the opinions expressed herein do not reflect the position or policy of the U.S. Office of Education, and no official endorsement by the U.S. Office of Education should be inferred."

TABLE OF CONTENTS

Foreword v

Preface vii

Acknowledgment ix

Job Description xi

Duties

A Performing Laboratory 1
B Operating Laboratory Equipment 29
C Utilizing Communication Skills 69
D Collecting Blood 85
E Performing Hematology Tests 95
F Performing Clinical Chemistry Tests 127
G Performing Urinalysis 165
H Performing Bacteriology Procedures 189
I Performing Blood Bank and Serology Procedures 211
J Performing Histology Procedures 221
K Performing EKG 233

FOREWORD

The occupational analysis project was conducted by The Instructional Materials Laboratory, Trade and Industrial Education, The Ohio State University in conjunction with the State Department of Education, Division of Vocational Education pursuant to a grant from the U.S. Office of Education.

The Occupational Analysis project was proposed and conducted to train vocational educators in the techniques of making a comprehensive occupational analysis. Instructors were selected from Agriculture, Business, Distributive, Home Economics and Trade and Industrial Education to gain experience in developing analysis documents for sixty-one different occupations. Representatives from Business, Industry, Medicine, and Education were involved with the vocational instructors in conducting the analysis process.

The project was conducted in three phases. Phase one involved the planning and development of the project strategies. The analysis process was based on sound principles of learning and behavior. Phase two was the identification, selection and orientation of all participants. The training and workshop sessions constituted the third phase. Two-week workshops were held during which teams of vocational instructors conducted an analysis of the occupations in which they had employment experience. The instructors were assisted by both occupational consultants and subject matter specialists.

The project resulted in producing one hundred two trained vocational instructors capable of conducting and assisting in a comprehensive analysis of various occupations. Occupational analysis data were generated for sixty-one occupations. The analysis included a statement of the various tasks performed in each occupation. For each task the following items were identified: tools and equipment; procedural knowledge; safety knowledge; concepts and skills of mathematics, science and communication needed for successful performance in the occupation. The analysis data provided a basis for generating instructional materials, course outlines, student performance objectives, criterion measures as well as identifying specific supporting skills and knowledge in the academic subject areas.

PREFACE

This document describes the duties and tasks performed by a laboratory assistant from a behavioral standpoint, analyzing each as to what the worker does, what mental processes he/she uses and how he/she reacts to the work situation.

The tasks required to accomplish the following are to develop competency in skills and related technical knowledge, to become familiar with chemical and medical terminology, to develop desirable work habits and attitudes necessary to obtain gainful employment, and to work in medical, research and development (r&d), and quality control laboratory occupations.

Although there are no task sheets listing attributes for personal development, this is a very important aspect of a program.

No specific duties were listed except for the medical portion of a program because the tasks are general in nature and provide an opportunity to develop a variety of general skills that are adaptable to a variety of employment situations.

ACKNOWLEDGMENT

We wish to acknowledge the valuable assistance rendered by the following subject matter specialists. They provided input to the vocational instructors in identifying related skills and concepts of each respective subject matter area and served as training assistants in the analysis process during the two-week workshops.

Rollin M. Barber, Psychology
The Ohio State University
Columbus, Ohio

Jodi Beittel, Communications
Columbus, Ohio

Diana L. Buckeye, Mathematics
University of Michigan
Avon Lake, Ohio

Rick Fien, Chemistry
The Ohio State University
Beachwood, Ohio

N.S. Gidwani, Chemistry
Columbus Technical Institute
Columbus, Ohio

Bruce A. Hull, Biology
The Ohio State University
Columbus, Ohio

Donald L. Hyatt, Physics
Worthington High School
Worthington, Ohio

Glenn Mann, Communications
Columbus, Ohio

Jerry McDonald, Physical Sciences
Columbus Technical Institute
Reynoldsburg, Ohio

Colleen Osinski, Psychology
Columbus Technical Institute
Columbus, Ohio

David Porteous, Communications
University of Connecticut
Colchester, Connecticut

James A. Sherlock, Communications
Columbus Technical Institute
Columbus, Ohio

Jim VanArsdall, Mathematics
Worthington High School
Worthington, Ohio

Lillian Yontz, Biology
The Ohio State University
Caldwell, Ohio

Acknowledgment is extended to the following I.M.L. staff members for their role in conducting the workshops; editing, revising, proofing and typing the analyses.

Faith Justice	Research Associate
Sheila Nelson	Administrative Assistant
Marsha Opritza	Editorial Consultant
Rita Buccilla	Typist
Peg Bushelman	Typist
Carol Fausnaugh	Typist
Mindy Fausnaugh	Typist
Rita Hastings	Typist
Carol Hicks	Typist
Sue Holsinger	Typist
Barbara Hughes	Typist
Carol Marvin	Typist
Patti Nye	Typist
Kathy Roediger	Typist
Mary Salay	Typist

JOB DESCRIPTION

A general laboratory assistant performs laboratory tests, applying practical knowledge of one or more fields to problem solving, according to perscribed standards, to determine chemical and physical characteristics or composition of solid, liquid, or gaseous materials. Using independent judgment and discretion in planning lab work, he/she conducts, tests and makes qualitative and quantitative analyses of materials for purposes such as quality control, process control, product development, determining conformity to specifications and the maintainence of health and safety standards.

A laboratory assistant works under the direction of a biochemist, chemical laboratory chief, analytical chemist, inorganic chemist, organic chemist, physical chemist, metallurgist, pathologist or medical technologist to carry out assigned tasks. He/she learns progressively more comprehensive duties and advances in ability to apply knowledge. He/she assists in supervision, training and development of lower level personnel.

A laboratory assistant prepares chemical solutions according to standard formulas. He/she also sets up, operates and adjusts laboratory equipment, such as ovens, gas cylinders, kilns, vacuum chambers, grinders, agitates, centrifuges, and condensers to prepare material for testing.

In industrial testing the laboratory assistant performs physical tests according to established procedures on dry and liquid substances used as ingredients in adhesives, lubricants, paint, paper and other products for purity, viscosity, density, absorption, melting point and flash point using tension balance, pH meter, and other instruments. He/she tests samples of manufactured products to verify conformance with heat resistance, tensile strength, ductility and other specifications.

A laboratory assistant in the medical laboratory performs routine tests in treatment and diagnosis of disease. He/she also prepares tissue samples for pathologist, takes blood samples and executes such laboratory tests as urinalyses and blood counts, using microscope, spectrophotometer, and similar instruments.

JOB DESCRIPTION CONTINUED

A laboratory assistant records and interprets operating and test data. By personal observation and investigation, he/she determines conformance to established procedures, methods and standards. He/she prepares written test reports, including graphs and charts describing procedures used, results obtained and conclusions reached.

Duty A Performing Laboratory Techniques

1 Clean glassware
2 Separate substances by filtration and decantation
3 Separate substances by evaporation and distillation
4 Determine density
5 Prepare solutions
6 Titrate solutions
7 Standardize solutions
8 Purify by coagulation and sedimentation
9 Determine boiling point
10 Determine melting point
11 Analyze by qualitative methods
12 Perform chromatography
13 Prepare a dispersion

(TASK STATEMENT) CLEAN GLASSWARE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY -- HAZARD
Dirty glassware Cleaning liquid Soap or detergent Brush Wash basin	Determine nature of contaminant Select appropriate cleaning method	Safety Always know characteristics of cleaning solutions Always wear protective clothing and glasses Evacuate fumes Properly handle glassware Hazard Chemical burn Lacerations Inhalation of noxious fumes Explosion and/or fire
DECISIONS	CUES	ERRORS

(TASK STATEMENT) CLEAN GLASSWARE

SCIENCE	MATH – NUMBER SYSTEMS
Forces acting on a body immersed or floating in a liquid [solubility] Possible chemical reactions of cleaning materials Arrangement of molecules, atoms and ions and the effect on structure and strength of materials Necessary concentrations of solutions Transfer of heat from one body to another	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Listening	Instructions Instructions	Comprehension Logic

(TASK STATEMENT) SEPARATE SUBSTANCES BY FILTRATION AND DECANTATION

15

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY -- HAZARD
Funnel Filter paper or medium Flask or beaker Suction flask Vacuum source	Filter Porosity of filter medium Decant	Safety Use glassware correctly
DECISIONS Select proper technique	**CUES** Cloudy filtrates indicate lack of percipient Heavy solutes can be decanted	**ERRORS** Repeat the process

15

(TASK STATEMENT) SEPARATE SUBSTANCES BY FILTRATION AND DECANTATION

SCIENCE	MATH – NUMBER SYSTEMS
Porosity phenomenology Density Viscosity	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Viewing	Substance for clarity	Visual analysis, Detail and inference, Describing, Color discrimination

(TASK STATEMENT) SEPARATE SUBSTANCES BY EVAPORATION AND DISTILLATION

TOOLS, EQUIPMENT, MATERIALS OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Evaporation container Heat source Condenser Water source Flasks Fume hood Thermometer Stoppers Adapters Boiling chips Lab record book	Evaporation Simple distillation Fractional distillation	Safety Approach dry point cautiously Use glassware correctly Use boiling chips to avoid hot spats Wear protective devices such as glasses Hazards Burns Explosions

DECISIONS	CUES	ERRORS
Determine temperature range in which collection takes place	Observe temperature plateaus and changes therefrom Observe liquid level Be aware of nature of material	Repeat process

(TASK STATEMENT) SEPARATE SUBSTANCES BY EVAPORATION AND DISTILLATION

SCIENCE	MATH – NUMBER SYSTEMS
Effect of heating and cooling on state of matter [change of matter from one form to another] Different substances have different boiling points	Measure of temperature [to include Kelvin]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing Viewing	Reference material Lab record book Observe liquid level and temperature changes	Comprehension, speed/rate, terminology Penmanship, spelling, terminology Visual analysis, Detail/inference

81

(TASK STATEMENT) DETERMINE DENSITY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Lab record book Analytical balance Graduated glassware Bottles or beakers Metric ruler Unknown substance Hydrometer	Measure volume accurately Weigh accurately Calculate density or Displace water and calculate	Safety Use glassware correctly
DECISIONS	**CUES**	**ERRORS**

(TASK STATEMENT) DETERMINE DENSITY

SCIENCE	MATH – NUMBER SYSTEMS
Composition of matter, including protons, neutrons, electrons, atoms, molecules, elements Chemical formulas Periodic table	D = weight/volume (48) in gm/ml [solids, liquids] or gm/l [gases] Basic arithmetic skills Measure of metric weight Metric liquid and dry measures Determination of area and volume of cylinders Determination of area and volume fo rectangular, cube and righ trianglar prisms

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Measuring scales Reference materials Record data in lab record book	Comprehension Terminology Penmanship, spelling

(TASK STATEMENT) PREPARE SOLUTIONS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Volumetric glassware Balance, analytical Distilled water Chemicals Reagent bottles Laboratory record book	Measure volumetrically Weigh materials Dilute accurately Label accurately (i.e. - chemical formula, strength of solution, date prepared, name)	Safety Always add solute to solvent Handle glassware properly Know characteristics of chemicals Hazard Fumes Burns Lacerations

DECISIONS	CUES	ERRORS
Determine nature of solution needed	Desired characteristics of product	Undesired properties present

(TASK STATEMENT) PREPARE SOLUTIONS

SCIENCE	MATH – NUMBER SYSTEMS
Composition of matter, including protons, nuetrons, electrons, atoms, molecules, and elements Concept of solution Arrangement of molecules, atoms and ions and the effect on structure and strength of materials Periodic table Chemical formulas	Molarity = FW(gms)/1000ml Normality = gram equivalent weight/1000ml % = parts/100 (32)(31) Ratio = 59 Basic arithmetic skills Measures of metric weight Metric liquid and dry measures Ratio and proportion

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Formulas, labels, reference materials	Comprehension, detail/inference, terminology
Writing	Formulas, labels, results in lab record book	Penmanship, spelling, description, usage

(TASK STATEMENT) TITRATE SOLUTIONS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Burette (or pipet) calibrated Standard solutions Indicators Beakers or flasks Unknown samples Laboratory record book	Prepare unknown sample Operate burette Recognize end point Calculate results Use indicators	Safety Use glasswear correctly

DECISIONS	CUES	ERRORS
If back titration is possible Repetition is necessary	Recognize approach of end point	Incorrect determination

(TASK STATEMENT) TITRATE SOLUTIONS

SCIENCE	MATH – NUMBER SYSTEMS
Chemical reaction occuring such as: Neutralization Oxidation - reduction Precipitation Complex ion formation Buffer systems Chemical equations	Addition and subtraction of whole numbers Multiplication and division with whole numbers Multiplication and division of decimal fractions Rounding off decimals and whole numbers Measure of metric weight Metric liquid and dry measures Given an instrument of measure, determine precision, and/or accuracy with respect to relative error, tolerance and significant digits Calculate mean Calculate denotation from mean Ratio and proportion Volume x normality = volume x normality % = V x N x eq. wt./ mg x 100 (32)

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing Reading Listening	Results in record book Directions and/or procedures Directions and/or procedures	Penmanship, spelling, usage Comprehension, terminology Concentration

(TASK STATEMENT) STANDARDIZE SOLUTIONS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Calibrated burette Primary standard Indicators Beakers or flasks Solution to be standardized Laboratory record book Analytical balance	Accurately measure primary standard and dilute Use indicators Titrate with barette Recognize end point Calculate normality	Safety Use glassware correctly

DECISIONS	CUES	ERRORS
Back titrate if necessary Repetition is necessary	Recognize approach of end point End points should be alike	

(TASK STATEMENT) STANDARDIZE SOLUTIONS

SCIENCE	MATH – NUMBER SYSTEMS
Equivalent weight of titrant = equivalent weight of desired constituent Chemical reactions occuring such as: Neutralization Oxidation - reduction Precipitation Complex ion formation Chemical equations Periodic table	V x N(normality) = mg. primary standard/equivalent weight Multiplication and division with whole numbers * Multiplication and division of decimal fractions Rounding off decimal and whole numbers Measure of metric weight Liquid and dry measures [metric] Given an instrument of measure, determine precision and/or accuracy with respect to relative error, tolerance, and significant digits Ratio and proportion Calculate mean

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing	Results in record book	Penmanship, spelling, usage
Reading	Directions and/or procedures	Comprehension, terminology
Listening	Directions and/or procedures	Concentration

(TASK STATEMENT) PURIFY BY COAGULATION AND SEDIMENTATION

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Beakers or flasks Chemicals - solution, non-solvent	Decant or filter Alter pH	Safety Glassware used correctly Wear protective clothing and glasses Hazards Flammability of materials

DECISIONS	CUES	ERRORS
Determine ultimate end point	Cloudiness	Stopping too soon

(TASK STATEMENT) PURIFY BY COAGULATION AND SEDIMENTATION

SCIENCE	MATH – NUMBER SYSTEMS
Hydrogen ion concentration Solubility data Effect on heating and cooling on state of matter [change of matter from one form to another] Periodic table	Basic arithmetic skills Scientific notation

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing	Results in record book	Penmanship, spelling, usage
Reading	Directions and/or procedures	Comprehension, terminology
Listening	Directions and/or procedures	Concentration

(TASK STATEMENT) DETEMINE BOILING POINT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Thermometer Heat source Vacuum source Hydrometer Glassware, calibrated Lab record book Distillation apparatus Reference material Transfer vehicle	Use distillation apparatus Place thermometer correctly and read Apply heat	Safety Use glassware correctly Wear protective devices Thermometers are fragile Hazard Mercuric vapor poisoning Lacerations Burns
DECISIONS	**CUES**	**ERRORS**
Determine rate of heating	Formation of bubbles	Damaged equipment or samples

(TASK STATEMENT) DETERMINE BOILING POINT

SCIENCE	MATH – NUMBER SYSTEMS
Vapor pressure Evaporation Atmospheric pressure Gas laws - Boyles, Charles, Gay-Lussac, Gas-law formula Fluids under pressure [incompressibility, transfer of pressure] Ideal gases Effect of heating and cooling on state of matter [change of matter from one form to another] Effect of heating and cooling on expansion of materials [change of dimensions] Argument of molecules, atoms, and ions and the effect on structure and strength of materials Periodic table Chemical formulas	Measures of temperature [including Kelvin] Conversion of atmospheres to mm of Hg, 1 atm = 760 mm Hg

30

COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing Reading Listening	Results in record book Directions and/or procedures Directions and/or procedures	Penmanship, spelling, usage Comprehension, terminology Concentration

(TASK STATEMENT) DETERMINE MELTING POINT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Lab record book Melting point apparatus Thermometer Heat source, controlled Unknown sample Spatula	Read thermometer Recognize transformation from solid to liquid	Safety Handle equipment correctly Wear protective devices Thermometers are fragile Hazard Burns Mercuric vapor poisoning Lacerations

DECISIONS	CUES	ERRORS
Determine melting point	Recognize initial signs of melting	Misread endpoints

(TASK STATEMENT) DETERMINE MELTING POINT

SCIENCE	MATH – NUMBER SYSTEMS
Melting point concepts Effect of heating and cooling on state of matter [change of matter from one form to another] Effect of heating and cooling on expansion of materials [change in dimensions] Arrangement of molecules, atoms, and ions and the effect on structure of strength of materials Periodic table Chemical equations	Measures of temperature [including Kelvin]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing	Results in record book	Penmanship, spelling, usage
Reading	Directions and/or procedures	Comprehension, terminology
Listening	Directions and/or procedures	Concentration

(TASK STATEMENT) ANALYZE BY QUALITATIVE METHODS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Chemicals Unknown samples Heat source Glassware Lab record book Fume hood Indicators Procedures sheets Test tubes Reference materials Timer Centrifuge	Chemically separate groups of elements Perform differential chemical reactions Analyze changes occurring	Safety Use glassware correctly Wear protective devices Use fume hood whenever gases are formed Hazard Lacerations Burns Noxious fumes

DECISIONS	CUES	ERRORS
Select procedure Select equipment and sequence	Color change recognition Formation of precipitates	Damaged equipment Inadequate observation

(TASK STATEMENT) ANALYZE BY QUALITATIVE METHODS

SCIENCE	MATH – NUMBER SYSTEMS
Specific characteristics of elements and element groups Chemical reactions Composition of matter, including protons, neutrons, electrons, atoms, molecules, elements Effect of heating and cooling on state of matter [change of matter from one form to another] Transfer of heat from one body to another Arrangement of molecules, atoms, ions, and the effect on structure and strength of materials Chemical formulas Chemical equations Periodic table	Measures of temperature [including Kelvin] Liquid and dry measures [metric] Read and interpret charts, tables, and/or graphs Measure of time

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Operating manual, reference material, procedures	Comprehension, description of mechanism definition, terminology
Writing	Record data and results in lab record book	Penmanship, spelling, classification, description
Viewing	Color change	Visual analysis, Color discrimination.

(TASK STATEMENT) PERFORM CHROMATOGRAPHY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Separation media Material to be separated Solvent Glassware Fume hood Lab record book	Prepare separation media Prepare material to be separated Calibrate media Load columns	Safety Avoid contact with skin Avoid inhalation of fumes Hazard Fainting
DECISIONS	**CUES**	**ERRORS**
Determine type of media to use Determine completion of separation	Frequently check calibration Type of substance to be analyzed	Ruin media No separation

35

(TASK STATEMENT) PERFORM CHROMATOGRAPHY

SCIENCE	MATH – NUMBER SYSTEMS
Nature of solvents Capillary action Osmosis Gravity	Basic arithmetic skills Measure metric length

COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing Reading Viewing	Results in lab record book Separation procedure	Penmanship, spelling Comprehension, technical terminology Visual analysis, Detail/inference

(TASK STATEMENT) PREPARE A DISPERSION

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Dispersion equipment Liquid Material to be dispersed Container Dispersion media Microscope Laboratory record book	Operate dispersion equipment at optimum efficiency Assess dispersion equipment capability Microscopic examination of dispersion	Safety Do not exceed limitations of equipment Use protective devices Hazard Chemical spills
DECISIONS	**CUES**	**ERRORS**
Determine degree of dispersion required Select dispersion equipment Select dispersion media if required	Recognize desired dispersion characteristics Recognize failure of equipment in terms of desired dispersion	

(TASK STATEMENT) PREPARE A DISPERSION

SCIENCE	MATH – NUMBER SYSTEMS
Centrifugal forces developed by bodies in rotation [force tending to discharge material from a rotating body] Forces acting on a body immersed or floating in a liquid Resistance of materials to liquid flow	Measure of particular size Measure with the Metric and English system and convert between them Scientific notation

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing Reading Viewing	Results in lab record book Instructional material Microscopic examination of dispersion characteristics	Penmanship, spelling, description Comprehension, description of mechanism logic Visual analysis, Logic, Detail/ inference

Duty B Operating Laboratory Equipment

1 Operate bunsen burner
2 Measure with calibrated glassware
3 Calibrate burette
4 Weigh with balances
5 Read barometer and thermometer
6 Operate pH meter
7 Operate centrifuge
8 Operate spectrophotometer
9 Operate microscope
10 Operate ovens
11 Operate timing devices
12 Operate autoclave
13 Operate muffle furnace
14 Measure with micrometer
15 Install regulators
16 Operate incubators and waterbaths
17 Operate dispersator
18 Operate microtome
19 Operate linear slide rule

30

(TASK STATEMENT) OPERATE BUNSEN BURNER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Bunsen burner Fuel source (gas) Tubing Striker	Identify purpose of each part Trace route of gas Adjust gas for proper flame Adjust air intake for proper flame	Safety Keep away from volatile solvents Turn off gas when flame is out Hazard Burns Inhalation of gas fumes
DECISIONS	**CUES**	**ERRORS**
Determine proper adjustment	Flame is hottest directly above inner cone (oxidizing flame) Blue flame is desirable	Insufficient heat Fumes, Smoke

(TASK STATEMENT) OPERATE BUNSEN BURNER

SCIENCE	MATH – NUMBER SYSTEMS
Combustion Transfer of energy from one form to another [potential to kinetic]	Ratio and proportion

COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Viewing	Size and color of flame	Visual analysis, Color discrimination

(TASK STATEMENT) MEASURE WITH CALIBRATED GLASSWARE

42

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY -- HAZARD
Calibrated glassware such as: grated cylinders flasks beakers pipets burettes centrifuge tube tubes Liquid to measure Lab record book	Pour liquids safely Handle glassware Determine meniscus	Safety Use of glassware correctly Wear protective devices Hazard Lacerations

DECISIONS	CUES	ERRORS
Select proper device	Cleanliness is essential for accurate measurement	Inaccuracies Contamination

42

(TASK STATEMENT) MEASURE WITH CALIBRATED GLASSWARE

SCIENCE	MATH – NUMBER SYSTEMS
Meniscus	Metric system of measurement Given an instrument of measure, to determine precision and/or accuracy with respect to relative error, tolerance and significant digits Liquid and dry measures [metric] Given a coding system, recognize and identify each unit involved by assigning necessary symbols, numerical or literal

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing	Record results in lab record book	Penmanship, spelling, usage

(TASK STATEMENT) CALIBRATE BURETTE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Burette Distilled water Beaker or flask Balance (top loader) Thermometer Graph paper Straight edge Pencil Laboratory record book	Volumetrically measure distilled water Weigh distilled water Record temperature Repeat at 10 ml. intervals Calculate error Draw calibration graph	Safety Use glassware correctly

DECISIONS	CUES	ERRORS
Determine if repetition is necessary	Clean equipment is essential Interpret results for approximate accuracy and precision	Inaccurate results

(TASK STATEMENT) CALIBRATE BURETTE

SCIENCE	MATH – NUMBER SYSTEMS
Relationship between volume and weight Effect of heating and cooling on expansion of materials [change of dimensions]	Basic arithmetic skills Measure of metric weight Measures of temperature [to include Kelvin] Liquid and dry measures [metric] Development of graphs comparing two complimentary sets of figures Read and interpret charts, tables, and/or graphs Calculate mean Deviation from the mean Given an instrument of measure, determine precision, and/or accuracy with respect to relative error tolerance, and significant digits

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing	Record results in lab record book	Penmanship, spelling, terminology, logic
Reading	Prepare graph of results	Comprehension, vocabulary
Listening	Procedures and/or directions Procedures and/or directions	Concentration, logic

(TASK STATEMENT) WEIGH WITH BALANCES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Balance Weighing paper or container Transfer device (spatula) Laboratory record book Substance to be weighed Set of weights	Clean balance pans Level balance Adjust to zero Determine tare weight Read and interpret scales	Safety Care in handling chemicals Instrument is delicate and requires careful handling

DECISIONS	CUES	ERRORS
Accuracy required Trip and triple beam balance -weighs to 1 decimal place - accurate to nearest whole number Top loading balance - weighs to 2 decimal places - accuracy to 1 decimal place Analytical balance - weighs to 4 decimal places - accurate to 3 decimal places	Care must be taken when adding or removing substances when pan is released Add weight in sequential order	Inaccurate weight

(TASK STATEMENT) WEIGH WITH BALANCES

SCIENCE	MATH – NUMBER SYSTEMS
Simple levers	Measure of metric weight Liquid and dry measures [metric] Addition and subtraction of whole numbers Addition and subtraction of decimal fractions Given an instrument of measure, determine precision, and/or accuracy with respect to relative error tolerance, and significant digits

47

COMMUNICATIONS		
PERFORMANCE MODES	**EXAMPLES**	**SKILLS/CONCEPTS**
Reading Writing	Instruction manual Results in lab record book	Comprehension, vocabulary, terminology Spelling, penmanship

47

(TASK STATEMENT) READ BAROMETER AND THERMOMETER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Barometer Thermometer Lab record book	Determine whether values should be read in English or Metric system Read and interpret scales on instruments	Safety Bendable Hazards Mercury contamination Lacerations

DECISIONS	CUES	ERRORS
Determine appropriate scale	Column separation	Inaccurate reading

(TASK STATEMENT) READ BAROMETER AND THERMOMETER

SCIENCE	MATH – NUMBER SYSTEMS
Atmospheric pressure Arrangement of molecules, atoms and ions and the effect on structure of strength of materials Gas laws Barometric pressure Absolute and relative humidity	Measures of temperature [to include Kelvin] Measures of length [metric] Liquid and dry measure [metric]

COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing Reading	Results in lab record book Scales on instruments	Spelling, penmanship, definition Comprehension, Detail/inference

(TASK STATEMENT) OPERATE pH METER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
pH meter Buffer solution, standard KCl, saturated Distilled water Electrodes - reference - standard Beakers Wash bottle Unknown sample Lab record book Transfer device Stirring device	Care of electrodes Calibrate meter Correct for temperature Read unknown pH	Safety Electrodes can not be scatched, touched or allowed to dry out Hazards Contamination from chemicals used
DECISIONS Determine proper calibration	**CUES** Liquid should be in motion during calibration pH meter must be warm Read on proper scale	**ERRORS** Inaccurate reading

(TASK STATEMENT) OPERATE pH METER

SCIENCE	MATH – NUMBER SYSTEMS
Concepts: Hydrogen ion concentration Acid - base theory Ionization potential	Scientific notation Ratio - proportion

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Results on indicator Results in lab record book	Description, terminology Penmanship, vocabulary

(TASK STATEMENT) OPERATE CENTRIFUGE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Centrifuge Head Cups Shields Centrifuge tubes Balance Water for balancing Lab record book	Balance tubes on opposite sides of centrifuge Set speed and time Decant liquid	Safety Keep cover closed to avoid flying glass Wear protective glasses Centrifuges must be cleaned, and lubricated regularly to insure operation Hazard Lacerations

DECISIONS	CUES	ERRORS
Select proper counter balance Select speed	Be sure tubes are balanced Clean cups and shields if breakage occurs	Damage or breakage Improper separation

(TASK STATEMENT) OPERATE CENTRIFUGE

SCIENCE	MATH – NUMBER SYSTEMS
Centripetal forces developed in bodies in rotation [force tending to pull material toward center of rotating body]	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Speed indicator	Comprehension, terminology, description of mechanism
Writing	Record in lab record book	Penmanship, spelling, terminology

(TASK STATEMENT) OPERATE SPECTROPHOTOMETER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY -- HAZARD
Spectrophotometer Cuvettes Lab record book Standards	Standardize and calibrate Set wave length Record % T or OD	Safety Spillage must be cleaned to prevent damage to instrument All parts must be sealed and tightened to function properly

DECISIONS	CUES	ERRORS
Select wave length	Meter must be warm Cuvettes must be free from scratches or fingerprints Bulbs burn out easily Cover must be closed when reading	No reading

(TASK STATEMENT) OPERATE SPECTROPHOTOMETER

SCIENCE	MATH – NUMBER SYSTEMS
Fundamentals of color Beer's law Composition of matter, including protons, neutrons, electrons, atoms, molecules, elements Structure arrangement of molecules, atoms, and ions and the effect on structure and strength of materials Analytical methods	

55

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Instruction manual Results on indicator Results in lab record book	Comprehension, terminology, description of mechanism Penmanship, spelling, logic

55

(TASK STATEMENT) OPERATE MICROSCOPE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Microscope with light source Prepared slide Immersion oil Lens paper Xylol	Place slide on stage Focus and examine on low power Focus and examine on high power Add oil drop and switch to oil immersion lens	Safety Never focus down on slide With oil, do not touch lens to slide Clean surface with neutral soap and water Hazard Break slide Scratch or break objective

DECISIONS	CUES	ERRORS
Select objective	Focus using both oculars - use both eyes Do not touch eyepiece with eyelashes Adjust light for best viewing Always use fine adjustment for final focusing Clean eyepieces and objectives before and after use with lens paper Be aware of functions of each part and possible adjustments Higher the magnification, the more light is necessary	Poor image Improper focus Damage objective Damage specimen

(TASK STATEMENT) OPERATE MICROSCOPE

SCIENCE	MATH – NUMBER SYSTEMS
Fundamentals of optics Refractive index Types of microscopes	Multiplication and division of whole numbers

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Microscope parts and usage	Comprehension, description of mechanism terminology
Viewing	Image through microscope	Visual analysis, Detail

(TASK STATEMENT) OPERATE OVENS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Oven Thermometer Material to be dried	Set appropriate temperature Determine length of time necessary for drying	Safety Close oven door Use gloves and/or tongs Hazard Burns

DECISIONS	CUES	ERRORS
Permit oven to come to equilibrium Set temperature Check thermostat	Function of test Pilot indicator	Damage sample

(TASK STATEMENT) OPERATE OVENS

SCIENCE	MATH – NUMBER SYSTEMS
Thermodynamics	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Operating instructions	Comprehension

(TASK STATEMENT) OPERATE TIMING DEVICES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY -- HAZARD
Timer intervals Clock Stop watch	Set timing devices Activate timing devices Read timing devices	Safety Do not drop Do not turn hand backwards Hazard Distruction of timing devices

DECISIONS	CUES	ERRORS
Select type of timer Check operation	Type of procedure Sound or movement	Improper timing Lost sequence

09

(TASK STATEMENT) OPERATE TIMING DEVICES

SCIENCE	MATH – NUMBER SYSTEMS
	Addition and subtraction of whole numbers Multiplication and division with whole numbers

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Timing device	Detail/inference

(TASK STATEMENT) OPERATE AUTOCLAVE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Autoclave Water Material to be autoclaved	Degree of sterilization necessary Evacuate air from autoclave Operate using manual Interpret dials and indicators	Safety Steam burns Hazard Burns

DECISIONS	CUES	ERRORS
Determine proper water level	Usual conditions are 121° C - 15 to 20 minutes	Damaged equipment or material Lost time

(TASK STATEMENT) OPERATE AUTOCLAVE

SCIENCE	MATH – NUMBER SYSTEMS
Reactions of steam under pressure Conditions necessary for adequate sterilization	Pressure gauge Temperature scale

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Operating instructions manual, dials and indicators	Comprehension, terminology, detail/ inference

(TASK STATEMENT) OPERATE MUFFLE FURNACE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Furnace Temperature measuring device Asbestos gloves Long tongs Crucibles Material to be fired Analytical balance	Set appropriate temperature Determine length of time necessary to operate	Safety Use protective devices Use tongs to insert and remove specimens Do not exceed temperature range of furnace Do not handle crucible with hands Hazard Burns

DECISIONS	CUES	ERRORS
Permit furnace to equilibrate Determine end point in firing process	Gages and light cycle	Burn out elements

(TASK STATEMENT) OPERATE MUFFLE FURNACE

SCIENCE	MATH – NUMBER SYSTEMS
Indestructability of energy and matter Effect of heating and cooling on expansion of materials [change of dimensions] Composition of matter, including protons, neutrons, electrons, atoms, molecules, elements Transfer of heat from one body to another Arrangement of molecules, atoms, and ions and the effect on structure and strength of materials Resistance of materials to change in shape [fluidity, elasticity, melting and boiling points]	Measures of temperature [to include Kelvin] Measure of metric weight Liquid and dry measures [metric]

59

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Operating instructions, temperature indicator	Comprehension, terminology, detail/inference

(TASK STATEMENT) MEASURE WITH MICROMETER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY -- HAZARD
Outside micrometer caliper Dial indicator	Hold micrometer Read micrometer scale Proper feel of micrometer for drag	Safety Never measure a rotating shaft Protect form exposure to corrosive Health protective devices Hazard Injury to hand

DECISIONS	CUES	ERRORS
Degree of accuracy required	Surface condition of micrometer and material to be measured	Damage to micrometer or sample

99

(TASK STATEMENT) MEASURE WITH MICROMETER

SCIENCE	MATH – NUMBER SYSTEMS
Work input, work output, friction and efficiency in simple machines [feel for drag] Arrangement of molecules, atoms and ions and the effect on structure and strength of materials [over tightening]	Measure of length [to include metric] Addition and subtraction of decimal fractions Given an instrument of measure, determine precision and/or accuracy with respect to relative error, tolerance and significant digits Multiplication and division with whole numbers

L9

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Scales and/or dial indicators	Detail/inference, comprehension, technical terminology

G7

(TASK STATEMENT) INSTALL REGULATORS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Regulator Bottled gas Wrench Tubing Fittings	Remove cap Secure gas cylinder Purge valve Secure regulator to tank Purge regulator Connect transmission line	Safety Hydrocarbon material Releaf valve Open tank valve all the way Protective devices Hazard Possible explosion

DECISIONS	CUES	ERRORS
Select proper operating pressure Select proper gauge for different type of gases	Type of regulator Type of gases	Damage to equipment

(TASK STATEMENT) INSTALL REGULATORS

SCIENCE	MATH – NUMBER SYSTEMS
Gay - Lussac law Charles law Boyles law	Numbering system Tank pressure Work pressure

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Instruction manuals	Comprehension

(TASK STATEMENT) OPERATE INCUBATORS AND WATERBATHS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Incubator or waterbath Material to be incubated Water for waterbath Thermometer	Determine purpose of incubation Determine temperature requirements for particular procedure	Safety Keep water away from electrical equipment Hazard Electrical shocks

DECISIONS	CUES	ERRORS
Select temperature	Make sure temperature remains constant Keep water level constant Temperature gages	Damage test media Over heating

(TASK STATEMENT) OPERATE INCUBATORS AND WATERBATHS

SCIENCE	MATH – NUMBER SYSTEMS
Optimum growth requirements Optimum color development or reaction completion	

COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedures	Comprehension

(TASK STATEMENT) OPERATE DISPERSATOR

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Dispersing equipment Liquid Material to be dispersed Container Dispersing media Microscope Power source	Set up according to direction Operate according to directions Select and assemble proper equipment	Safety Selection of proper electrical source Hazard Electrical shock
DECISIONS	**CUES**	**ERRORS**
Select dispersion equipment Select dispersing media if required Determine purpose and expected results	Recognize failure of equipment to perform	Improper dispersion

(TASK STATEMENT) OPERATE DISPERSATOR

SCIENCE	MATH – NUMBER SYSTEMS
Centrifugal forces developed by bodies in rotation [force tending to discharge material from a rotating body] Forces acting on a body immersed or floating in a liquid Resistance of materials to liquid flow measure of particle size	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Instruction manual	Comprehension

73

(TASK STATEMENT) OPERATE MICROTOME

74

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Microtome Knife Hone Strop Material to be microtomed	Insert sharpened knife Insert mounted specimen Adjust for desired thickness Obtain desired sections Hone and strop knife Adjust knife set screws	Safety Handling blade Hazard Severe lacerations
DECISIONS	**CUES**	**ERRORS**
Determine a satisfactory specimen Select type of cutter	Make adjustment cuts (five) Material to be cut	Damage to cutter Damage to specimen Improper cut

(TASK STATEMENT) OPERATE MICROTOME

SCIENCE	MATH – NUMBER SYSTEMS
Inertia and momentum [bodies at rest and bodies in motion] Resistance of materials to change in shape [bending, twisting, stretching]	Measures of length [metric] Given an instrument of measure, determine precision and/or accuracy with respect to relative error tolerance and significant digits

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Instruction manual, thickness gauge	Comprehension, terminology, detail/ inference

(TASK STATEMENT) OPERATE LINEAR SLIDE RULE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Slide rule	Check and adjust scale alignment Determine proper scales Manipulate fine adjustment of the slide and cross hair	Safety Handle with care Hazard Misalignment of scales

DECISIONS	CUES	ERRORS
Scales required for calculation Select proper index	Standard procedures	Improper reading

(TASK STATEMENT) OPERATE LINEAR SLIDE RULE

SCIENCE	MATH – NUMBER SYSTEMS
Theory of scale function	Multiplication and division with whole numbers Multiplication and division of decimal fractions Rounding off decimals and whole numbers Extracting square root Understanding and use of logarithms Scientific notation Use of trigonometric functions in solution of problems involving right triangles

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Instruction manual, scale	Comprehension, detail/inference

Duty C Utilizing Communication Skills

1 Read and follow specifications (procedures)
2 Prepare table of data
3 Prepare graphs
4 Make oral presentation
5 Record data in laboratory record book
6 Write reports
7 Utilize reference material

78

(TASK STATEMENT) READ AND FOLLOW SPECIFICATIONS (PROCEDURES)

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Specifications Laboratory record book Equipment and material called for in specifications	Read for general information Read for specifics Assemble materials and equipment Follow logical sequential order of specified work Report work in specified terms	Hazard Specified results are determined by following procedures specified

DECISIONS	CUES	ERRORS
Determine and select proper specifications		

(TASK STATEMENT) READ AND FOLLOW SPECIFICATIONS (PROCEDURES)

SCIENCE	MATH – NUMBER SYSTEMS
	Reporting data in mathematical terms specified

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Report work finished	Comprehension, technical terminology Penmanship, spelling, progress reports, terminology

(TASK STATEMENT) PREPARE TABLE OF DATA

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD 81
Laboratory record book Pencil Columned paper Data to be tabulated	Determine purpose of the table Organize data in logical arrangement Label accurately Enter data	

DECISIONS	CUES	ERRORS
Size of tables	Type of data	Difficult to read

(TASK STATEMENT) PREPARE TABLE OF DATA

SCIENCE	MATH – NUMBER SYSTEMS
	Report data is specified mathmatical terms Use of numbers (without calculation) Indexing Coding

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing Reading	Prepare table: column heading, footnotes, numerical data Information to be tabulated	Penmanship, informational reports, format/content, usage Detail/inference, speed/rate

(TASK STATEMENT) PREPARE GRAPHS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Graph paper Pencil Straight edge French curve Data to be graphed	Determine purpose for the data and use of graph Apply general terminology pertaining to graphs Prepare graphs using a) linear paper, b) semi-log paper, c) log-log paper	

DECISIONS	CUES	ERRORS
Select size of graph paper	Type of indicator to be used	Poor readability

(TASK STATEMENT) PREPARE GRAPHS

SCIENCE	MATH – NUMBER SYSTEMS
	Read and interpret charts, tables, and/or graphs Development of graphs comparing two complimentary sets of figures Locate by approximation rational numbers and integers on the number line (sequential ordering)

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing Speaking	Graphs, charts Plot graphs With supervisor	Comprehension, recommendation reports Penmanship, format, usage Enunciation, poise, terminology/ vocabulary

84

84

(TASK STATEMENT) MAKE ORAL PRESENTATION

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Laboratory records	Speak clearly and concisely in ''trade'' language and corresponding ''common'' language Analyze and interpret laboratory results orally	

DECISIONS	CUES	ERRORS

(TASK STATEMENT) MAKE ORAL PRESENTATION

SCIENCE	MATH – NUMBER SYSTEMS

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Presentation	Clarity of expression, conciseness, technical vocabulary, organization, diction, logic, work usage, emotional appeal

(TASK STATEMENT) RECORD DATA IN LABORATORY RECORD BOOK

87

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Laboratory record book Pen Data to be recorded	Enter Title Date Purpose Procedure Data Observations Calculations Conclusions	
DECISIONS	**CUES**	**ERRORS**

(TASK STATEMENT) RECORD DATA IN LABORATORY RECORD BOOK

SCIENCE	MATH – NUMBER SYSTEMS
	Basic arithmetic skills Measure of metric length & weight, time & speed, temperature [to include Kelvin], liquid & dry measures [metric] Extracting square root Solution of problems involving numerical & literal algebraic expressions Use of exponents to indicate the power of a number Addition of positive and negative numbers Algebraic subtraction, multiplication and division of numerical and literal terms Manipulation of formula involving three factors Ratio and proportion Determination of area and volume of cylinders Development of graphs comparing two complimentay sets of figures Given an instrument of measure, determine precision and/or accuracy with respect to relative error, tolerance, and significant digits; Scientific notation Calculate mean, deviation from mean, and relative average deviation (in % or ppt)

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Test results Record in lab book	Comprehension, terminology, technical vocabulary, detail/inference Penmanship, precision and conciseness

(TASK STATEMENT) WRITE REPORTS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Laboratory record book Paper Pen	Organizing factual information to: Write record of telephone conversation Write letter report Write informational (progress) report Write analytical report Develop data in a logical manner	Hazard Protection

DECISIONS	CUES	ERRORS
Determine audience level	Nature of data and use of report	Insufficient information

(TASK STATEMENT) WRITE REPORTS

SCIENCE	MATH – NUMBER SYSTEMS
Inductive reasoning	Organize data

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Lab records Informational and analytical reports, Section of annual reports and other external and internal publications	Comprehension Clarity of expression, proper word usage, grammatical and technical precision, progress report, physical experiment

(TASK STATEMENT) UTILIZE REFERENCE MATERIAL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
References Handbook of chemistry and physics Others	Flexibility in interpreting basis Technical vocabulary	
DECISIONS	**CUES**	**ERRORS**

16

(TASK STATEMENT) UTILIZE REFERENCE MATERIAL

SCIENCE	MATH – NUMBER SYSTEMS
Chemical symbols	Read and interpret charts, tables, and/or graphs Scientific notation

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Chemical and mathematic notation	Comprehension, terminology, detail/ inference

Duty D Collecting Blood

1 Determine type blood sample needed
2 Preform capillary puncture
3 Perform venipuncture using syringe or vacutainer
4 Prepare blood samples for analysis

(TASK STATEMENT) DETERMINE TYPE BLOOD SAMPLE NEEDED

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Requisition for blood test	Determine time of drawing Interpret from procedure whether serum, plasma, whole blood are needed Determine amount blood necessary Determine type anticoagulant needed dictated by tests to be performed a)Sodium floride (glucose) b)Potassium oxalate (chemistry process) c)Double oxalate (hemotology) d)EDTA (hemotology) e)Sodium atrate (prothrombin) f)Heparin	
DECISIONS	CUES	ERRORS

(TASK STATEMENT) DETERMINE TYPE BLOOD SAMPLE NEEDED

SCIENCE	MATH – NUMBER SYSTEMS
Anticoagulant theory Blood clotting mechanism Characteristics of different anticoagulants Composition of blood Treatment necessary to obtain: 1) serum 2) plasma 3) whole blood	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Requests for laboratory work, procedure	Comprehension, technical (medical) terminology

(TASK STATEMENT) PERFORM CAPILLARY PUNCTURE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Alcohol Lancet Cotton Collection equipment for specific tests	Determine collection site Apply antiseptic Puncture site to obtain free flowing sample Remove blood sample Stop bleeding	Safety Complete sterility must be maintained Used blades must be discarded safely Technician should not ''stick''self Hazard Contamination of sample Infect patient - unsterile conditions Lacerations from used blades Infection of technician
DECISIONS	**CUES**	**ERRORS**
Determine where to take sample	Area used must be free from organisms or edema First drop of blood can not be used Excessive squeezing contaminates sample with tissue fluid Pipets should not touch skin	Contamination Injury

(TASK STATEMENT) PERFORM CAPILLARY PUNCTURE

SCIENCE	MATH – NUMBER SYSTEMS
Circulatory system Aseptic conditions	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Requisitions	Comprehension, technical (medical) terminology
Writing	Labels	Accuracy, Penmanship

(TASK STATEMENT) PERFORM VENIPUNCTURE USING SYRINGE OR VACUTAINER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Alcohol Cotton or gauge Syringe and needle -or- Shield, vacutainer, needle Tourniquet	Prepare patient Prepare needle and syringe Apply the tourniquet Select vein Apply antiseptic Insert needle Withdraw blood Release tourniquet Withdraw needle Prevent bleeding Transfer blood to proper container	Safety Aseptic conditions must prevail Used equipment must be disposed of properly Tourniquet application must not be prolonged - release before withdrawing needle Needle should not go through vein Artery should not be punctured Assure not to puncture self Hazard Infections of patient Hematoma Prolonged bleeding from lack of pressure applied Lacerations
DECISIONS	**CUES**	**ERRORS**
Select proper location	Arterial blood spurts; venous flows Needle and syringe must be dry Needle must be large enough to prevent trauma Blood must be allowed to flow Patient and technician must be in comfortable position	Injury Miss vein or puncture vein

(TASK STATEMENT) PERFORM VENIPUNCTURE USING SYRINGE OR VACUTAINER

SCIENCE	MATH – NUMBER SYSTEMS
Circulatory system-anatomy and physiology Aseptic conditions Patient concern and treatment	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Requisitions	Comprehension, technical (medical) terminology, process report - instructions
Writing	Labels	Accuracy, penmanship

(TASK STATEMENT) PREPARE BLOOD SAMPLES FOR ANALYSIS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Blood sample Anticoagulant Centrifuge Test tubes or vacutainers Pasteur pipet and bulb Refrigerator - freezer	Mix whole blood samples with anti-coagulant Mix samples for plasma, centrifuge and separate plasma from cells Prepare serum samples a) allow blood to clot b) centrifuge c) aspirate serum from clot Label specimens completely Store specimens if possible	Safety Balance centrifuge Use pipets carefully Do not aspirate serum into mouth Do not preserve unless absolutely necessary Hazards **Distortion of sample** **Breakage of sample** Lacerations Breakdown of constituents

DECISIONS	CUES	ERRORS
Decide what analysis to be made	Hemolysis necessitates redrawing of specimen Abnormalities in sample should be noted Clean, dry glassware must be used Most determinations must be performed in fresh specimens. If stored, allow to return to room temperature before use	Improper results

(TASK STATEMENT) PREPARE BLOOD SAMPLES FOR ANALYSIS

SCIENCE	MATH – NUMBER SYSTEMS
Composition of blood Characteristics of blood Appearance of blood - normal and abnormal	

COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Instructions	Comprehension, technical (medical) terminology
Writing	Label specimens	Penmanship, accuracy

Duty E Performing Hematology Tests

1 Perform RBC using hemacytometer
2 Perform WBC using hemacytometer
3 Perform hemoglobin by cyanmethemoblobin method
4 Perform microhematocrit
5 Prepare blood smear
6 Stain blood smear
7 Examine blood smear
8 Perform erythrocyte sedimentation rate by Wintrobe method
9 Perform bleeding time (Duke or Ivy)
10 Perform coagulation tests
11 Perform prothrombin time
12 Perform reticulocyte count
13 Perform platelet count
14 Calculate indices
15 Maintain hematology equipment

102

(TASK STATEMENT) PERFORM RBC USING HEMACYTOMETER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
RBC diluting pipet (thoma) Aspirator tubing and mouthpiece Blood sample Diluting fluid - Hayem's, Gower's solution Mechanical shaker Hemacytometer Hemacytometer cover glass Alcohol or xylene Microscope Cell counter Pipet cleaning solutions - water, alcohol, acetone Gauze Laboratory record book	Dilute blood sample 1:200 Mix and mount on hemacytometer Count RBC in 1/5 mm^2 on microscope with high dry (40x) Calculate RBC/mm^3	Safety Coverglass can be broken if lens touches Solutions cannot be aspirated into mouth Hazard Scratched or cracked lens Broken coverglass Poisoning from chemicals

DECISIONS	CUES	ERRORS
In severe anemia, dilution can be altered	Repeat until 10% agreement reached Glassware must be clean Improper mounting of specimen causes errors in count	

103

(TASK STATEMENT) PERFORM RBC USING HEMACYTOMETER

SCIENCE	MATH – NUMBER SYSTEMS
Characteristics and purpose of RBC's Formation of RBC's Decrease = anemia Increase = polycythemia Function of hemacytometer Normal = 4.5 - 5.5 million/mm^3 - men = 4.0 - 5.0 million/mm^3 - women Terminology of RBC and diseases Sources of error Parts of CBC Destruction of RBC Variations from normal	Formula - $\frac{\text{Number of cells counted x dilution in 1/5 mm}}{\text{0.2 area x 0.1 depth}} = RBC/mm^3$ or number of cells x 20,000 Ratio and proportion Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Directions	Comprehension, technical (medical) terminology
Writing	Record results, labels	Penmanship, spelling, accuracy

(TASK STATEMENT) PERFORM WBC USING HEMACYTOMETER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
WBC diluting pipet (thoma) Aspirator tubing and mouthpiece Blood sample Diluting fluid - 2% acetic acid or 0.1N HCL Mechanical shaker Hemacytometer Hemacytometer cover glass Alcohol Microscope Cell counter Pipet cleaning solutions Gauze Laboratory record book	Dilute sample 1:20 Mix and mount on hemacytometer Count WBC in four corner square mm with low power (10x) Calculate WBC/mm^3	Safety Aspirate blood and diluting fluid carefully Cover glass can be broken if lens touches Hazard Scratched or cracked lens Broken coverglass Chemical poisoning

DECISIONS	CUES	ERRORS
Identify area to be used in count	Count cells touching top and left linear Repeat to agreement within 500/mm^3	Faulty equipment Faulty technique Cell distribution Nature of sample Small sample size

(TASK STATEMENT) PERFORM WBC USING HEMACYTOMETER

SCIENCE	MATH – NUMBER SYSTEMS
Characteristics and purposes of WBC Formation of WBC's Increase = leukocytosis Decrease - leukopenia Function of reagent and equipment Normal = 5000 - 10,000/mm^3 Terminology of WBC and diseases Sources of error Parts of CBC	$\frac{\text{Number of cells counted} \times \text{dilution of blood}}{\text{Volume (area} \times \text{depth)}} = WBC/mm^3$ or number counted x 50 Ratio and proportion Basic arithmetic skills

991

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Procedures Record results, label	Comprehension, medical terminology Penmanship, spelling, accuracy

(TASK STATEMENT) PERFORM HEMOGLOBIN BY CYANMETHEMOGLOBIN METHOD

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Spectrophotometer Drabkin's reagent (fresh) Cuvettes Pipettes Sahli pipet Tubing and mouthpiece Blood sample Semi-log graph paper Straight edge Commercial hemoglobin standard Laboratory record book Timer	Standardize photometer using commercial standards. Draw calibration curve Dilute blood 1:251 (5 ml reagent .02 blood) Allow color development Read percent transmittence on photometer Determine concentration from calibration curve	Safety Drabkin's reagent is poisonous Hazard Inhalation of fumes

DECISIONS	CUES	ERRORS
Determine conditions of equipment and reagents	Accuracy is dependent or technique, equipment, reagent stability, glassware cleanliness Control should be utilized to check technique, equipment, reagents Rinse Sahli pipet with reagent	Improper results

(TASK STATEMENT) PERFROM HEMOGLOBIN BY CYANMETHEMOGLOBIN METHOD

SCIENCE	MATH – NUMBER SYSTEMS
Characteristics and purposes of hemoglobin Anemia = decrease in quality and quantity of RBC and hemoglobin Compounds of hemoglobin Terminology and abbreviation - hemoglobin	Liquid and dry measures [metric] Ratio and proportion Read and interpret charts, tables, and/or graphs Measure with the metric system Given an instrument of measure, determine precision and/or accuracy with respect to relative error, tolerance, and significant digits Measure of time Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Procedure Record results, label, **draw** calibration graph	Comprehension, medical terminology Penmanship, spelling, accuracy, format description

(TASK STATEMENT) PERFORM MICRO-HEMATOCRIT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Capillary or whole blood sample Heparinized capillary tubes Plasticene or seal-ease (sealing medium) Micro-hematocrit centrifuge Micro-capillary reader Laboratory record book	Fill capillary tube Seal vacant end Centrifuge **Read % on reader**	Safety Use caution when handling capillary tubes Do not lift cover until rotation has completely stopped Hazard Trauma - lacerations Trauma - to operator

DECISIONS	CUES	ERRORS
Determine how to take sample	Blood sample must be properly collected and preserved Centrifugation must be standardized	Improper results

(TASK STATEMENT) PERFORM MICRO-HEMATOCRIT

SCIENCE	MATH – NUMBER SYSTEMS
Uses of hematocrit Comparison of RBC tests RBC diseases and characteristics Normal = 40 - 50% males 37 - 45% females Centrifugal forced developed by bodies in rotation [force tending to discharge material from a rotating body]	Read and interpret charts, tables, and/or graphs Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Procedures Record results, label	Comprehension, medical terminology Penmanship, accuracy

(TASK STATEMENT) PREPARE BLOOD SMEAR

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD 111
Capillary blood sample Precleaned glass slides Spreader slide Pencil	Spread drop of blood with spreader slide thinly Air dry smear Label accurately in blood	Hazard Lacerations from slides

DECISIONS	CUES	ERRORS
Select methods for preparing smear	Blood must not be contaminated with tissue fluid or antisepties Feather edge indicates good smear - smooth, moderately thin	Damage sample Poor quality smear

(TASK STATEMENT) PREPARE BLOOD SMEAR

SCIENCE	MATH – NUMBER SYSTEMS
Purpose of blood smears Terminology of hematology Characteristics of good smears Sources of blood samples	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing	Label	Penmanship, accuracy

(TASK STATEMENT) STAIN BLOOD SMEAR

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Well made blood smear Wright's stain Phosphate buffer (pH 6.4) Water Staining rack Timer	Fix smear with Wright's stain Add buffer to stain Wash with water Wipe dye off back of slide Air dry, standing on end	Hazard Stained hands and cloths

DECISIONS	CUES	ERRORS
Determine standards for accuracy	Accurate timing is essential Metallic sheen should form with buffer pH must be exact Errors occur due to reagents, timing Timing varies with each batch of reagents Rapid drying prevents distortions	Incorrect results

(TASK STATEMENT) STAIN BLOOD SMEAR

SCIENCE	MATH – NUMBER SYSTEMS
Wright's stain fixes dead cells Chemical affinity of tissues for stain pH hypotonic - hypertonic	Measure of time

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedure	Comprehension, technical (medical) terminology

(TASK STATEMENT) EXAMINE BLOOD SMEAR

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Properly stained blood smear Microscope Immersion oil Blood cell calculator Laboratory record book	Evaluate smear quality with low power objective Estimate white count and scan for abnormal cells (low power) Examine RBC morphology (oil immersion) Evaluate platelets (oil) Identify and count 100 WBC's (oil) Repeat abnormalities and % of each type WBC	Hazard Microscope lens can be scratched or broken

DECISIONS	CUES	ERRORS
Questionable smears should be reviewed by pathologist	Number of cells to be counted is dependent on total WBC	

511

(TASK STATEMENT) EXAMINE BLOOD SMEAR

SCIENCE	MATH – NUMBER SYSTEMS
Types of white cells - Neutrophils, Eosinophils, Basophils Lymphocytes, Manocytes Appearance of normal and abnormal or immature RBC's and WBC's **Blood cell developmental series** Abnormal RBC conditions - anisocytosis, **parkilocytosis,** hypochromasia, sickle cells, polychromatophilia, basophylic stippling, mecleated red blood cells, target cell Terminology of hematology Objectives of differential Disorders indicated by abnormalities Correlation with other hematology tests	Correct for nucleated RBC Correction = $\frac{\text{uncorrected/mm}^3}{100 + \text{number nucleated RBC}}$ Finding a percent of a number and what percent one number is of another Locate by approximation rational numbers and integers on the number line (sequential ordering)

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing Viewing	Morphology guides and procedures Record results Blood smear	Comprehension Penmanship, spelling Visual analysis, Detail/inference, Color discrimination

(TASK STATEMENT) PERFORM ERYTHROCYTE SEDIMENTATION RATE BY WINTROBE METHOD

447

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Whole blood sample Wintrobe tube Pasteur pipet Sedimentation rack Centrifuge Timer Correction chart Laboratory record book	Fill Wintrobe tube accurately Time vertical standing accurately Read tube graduations Centrifuge Correct for anemia	

L11

DECISIONS	CUES	ERRORS
Select anticoagulant	Anticoagulant used must preserve RBC morphology No hemolysis can be present Tubes must stand perfectly vertical Test must be performed within ? hours of drawing Accurate timing is essential	Improper results Damaged sample

(TASK STATEMENT) PERFORM ERYTHROCYTE SEDIMENTATION RATE BY WINTROBE METHOD

SCIENCE	MATH – NUMBER SYSTEMS
Plasma proteins RBC morphology Increase - infections, and defense mechanisms active Normal - 5 - 20 mm for women 5 - 15 mm for men Sources of error	Read sequential scales Measure of time

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedures, correction chart	Comprehension, technical (medical) terminology
Writing	Record results, label	Penmanship, spelling, accuracy

(TASK STATEMENT) PERFORM BLEEDING TIME (DUKE OR IVY)

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
70% alcohol Lancet Stopwatch Blotting paper Cotton Blood pressure cuff Laboratory record book	Perform capillary puncture Time bleeding accurately	Hazard Technician should not stick self
DECISIONS	**CUES**	**ERRORS**
Decide where to puncture	Adequate, standardized punctures are essential (3mm depth) Prolonged or shortened results must be repeated Increase shows platelet decrease	Improper results

119

(TASK STATEMENT) PERFORM BLEEDING TIME (DUKE OR IVY)

SCIENCE	MATH – NUMBER SYSTEMS
Clotting mechanism Tissue factors Normal = 1-6 minutes	Measure of time

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Procedures Results	Comprehension, technical terminology Penmanship, spelling

(TASK STATEMENT) PERFORM COAGULATION TESTS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Test tubes (ID, 8 mm) Blood sample Stopwatch Non-heparinized capillary tubes Lancet Syringe and needle Alcohol and cotton balls Tourniquet Saline Laboratory record book	Describe clot retration Interpret capillary coagulation time Accurately read Lee-White clotting time	Safety - use glassware correctly Hazard - lacerations from tubes

DECISIONS	CUES	ERRORS
Determine proper sample appearance	Tissue juice contamination alters results (shortens time) Tests do not differentiate between clotting deficiencies and anticoagulant presence Capillary tests are unreliable Lee-White is influenced by test tube size and surface, temperature, and agitation	Poor sample Improper results

(TASK STATEMENT) PERFORM COAGULATION TESTS

SCIENCE	MATH – NUMBER SYSTEMS
Blood coagulation theory Normal Lee-White = 15 - 25 minutes Normal clot retraction = Begin 1 hour Complete 18 hours Capillary coagulation time = 2 - 6 minutes Methods of prolonging or retarding coagulation time	Measure of time

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Procedures Record results	Comprehension, medical terminology Penmanship, spelling, accuracy

(TASK STATEMENT) PERFORM PROTHROMBIN TIME

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Blood sample preserved with sodium oxalate (0.1M) Stock thromboplastin Saline 0.02 M $CaCl_2$ Control solution Centrifuge Test tubes - 8 x 75 mm 37° C incubator Timer Pipets Light source Laboratory record book	Prepare correct 1:10 blood sample Perform and interpret control solutions Observe clot formation accurately	

DECISIONS	CUES	ERRORS
Determine standards of accuracy	Must be preformed within four hours of drawing specimen Used often for patients on anticoagulant therapy or screening for deficiencies Samples must be performed in duplicate or triplicate and agree within one second Controls must be used to validate reagents and procedure Accurate timing is essential	Improper timing Incorrect results

123

(TASK STATEMENT) PERFORM PROTHROMBIN TIME

SCIENCE	MATH – NUMBER SYSTEMS
Blood coagulation theory and mechanism Normal = 11.2 - 14.5 seconds Mechanism of anticoagulant therapy	Dilutions Measure of time Measure of metric volume Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Record results, label	Comprehension, medical terminology Penmanship, spelling, accuracy

(TASK STATEMENT) PERFORM RETICULOCYTE COUNT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Brilliant cresyl blue or new methylene blue Sodium citrate and sodium chloride or Sodium oxalate and sodium chloride Capillary or venous blood Test tube 8 x 75mm Pipet Timer Slides Microscope Immersion oil Hand counter Aspirator tubing and mouthpiece Laboratory record book	Prepare stain Mix stain and blood accurately Spread mixture on slides Identify number reticulocytes/number of erythrocyte counted under oil immersion	Hazard Lacerations from slides Cracked lens or slide Aspiration of solutions

DECISIONS	CUES	ERRORS
Identify type of blood cell	2000 RBC's are counted - 1000 on each of 2 slides Count in medium thin portion of slides Precipitated stain must not be confused with reticulocytes Stain should be filtered immediately before use Allowable difference between slides = 5-7 cells	Count wrong kind of cell Inaccurate count

(TASK STATEMENT) PERFORM RETICULOCYTE COUNT

SCIENCE	MATH – NUMBER SYSTEMS
RBC maturation series RBC morphology and abnormalities Normal = 0.8 - 1.5% retics Formation of RBC Physiology of anemias Supravital staining Uses of reticulocyte count	$\frac{\text{Number reticulocytes counted}}{\text{Number erythrocyte counted}} \times 100 = \%$ retics Measure of metric volume Basic arithmetic skills

921

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing Reading Viewing	Record results, labels Slide	Penmanship, spelling, accuracy Comprehension, medical terminology Visual analysis, Color discrimination

(TASK STATEMENT) PERFORM PLATELET COUNT

127

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Rees-Ecker diluting fluid RBC diluting pipet Capillary or venous blood Pipet shaker Blood smears Hemocytometer Gauze Petri plate contained moistened gauze Microscope Hand counter Aspirator tubing and mouthpiece Laboratory record book	Dilute blood with Rees-Ecker Mount specimen or hemocytometer Allow adequate settling Identify and count platelets using high dry in center square millimeter Calculate results	Hazard Aspiration of solution Broken cover glass Scratched or broken lens

DECISIONS	CUES	ERRORS
Identify type of cells	Platelets are small, attach easily to glassware, clump easily Diluent must be stored in refrigerator and filtered prior to use Glassware must be very clean Counts must be done in duplicate and must agree within 20,000 cells	Count wrong type of cell Inaccurate count

L21

(TASK STATEMENT) PERFORM PLATELET COUNT

SCIENCE	MATH – NUMBER SYSTEMS
Blood coagulation theory Formation of platelets Normal = 170,000 - 400,000 cells/mm^3 Terminology of abnormal platelet quantity Use of platelet count	Number of platelets counted x $\frac{1 mm^3 \times 200 \text{ (dilution of blood)}}{0.1\ mm^3}$ Platelets/mm^3 or number counted x 200 Measure of metric volume Basic arithmetic skills

COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing Viewing	Record results, label Slide	Comprehension, medical terminology Penmanship, spelling, accuracy Visual analysis, Color discrimination

(TASK STATEMENT) CALCULATE INDICES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD 129
Results of RBC Hematocrit Hemoglobin Anemia classifier (blood constants calculator) Laboratory record book	Calculate MCV Calculate MCH Calculate MCHC	
DECISIONS	**CUES**	**ERRORS**

129

(TASK STATEMENT) CALCULATE INDICES

SCIENCE	MATH – NUMBER SYSTEMS
Comparison of RBC, Hematocrite, Hemoglobin Normal blood value range Values of indices Theory of indices	MCV (cu. microns) = $\frac{\text{Hematocrit} \times 10}{\text{RBC (millions)}}$ MCH (uug) = $\frac{\text{Hemoglobin} \times 10}{\text{RBC (millions)}}$ MCHC (%) = $\frac{\text{Hemoglobin} \times 100}{\text{Hematocrit}}$ Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedures, classifier	Comprehension, medical terminology, description of mechanism
Writing	Record and report results	Penmanship, spelling, progress report

(TASK STATEMENT) MAINTAIN HEMATOLOGY EQUIPMENT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Water Alcohol Acetone Xylol Gauze Vacuum Pipet washer Cleaning jars Aspirator Blood pipet cleaning wires	Clean diluting pipets Clean hemocytometer Clean slides	Hazards Lacerations Burns

DECISIONS	CUES	ERRORS
Determine proper conditions	Contamination Failure to function	Inoperative equipment

131

(TASK STATEMENT) MAINTAIN HEMATOLOGY EQUIPMENT

SCIENCE	MATH – NUMBER SYSTEMS

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Viewing	Inspect equipment	Visual analysis, Detail/inference

132

Duty F Performing Clinical Chemistry Tests

1 Perform glucose test by Nelson-Samogyi method
2 Perform glucose by Folin-Wu method
3 Perform urea nitrogen test by nesslerization
4 Perform uric acid test
5 Perform creatinine test (Folin method)
6 Perform total protein, albumin, globulin test (Biuret method)(TP/AG)
7 Perform cholesterol test
8 Perform chloride test (Scholes and Scholes)
9 Perform carbon dioxide (CO_2) determination (Van Slyke)
10 Perform sodium and potassium determination (Flame photometer)
11 Perform calcium test (Clark-Callip)
12 Perform inorganic phosphorous test
13 Perform amylase test (Samogyi method)
14 Perform SGOT, SGPT, LDH tests (Sigma)
15 Perform alkaline and acid phosphatase tests
16 Perform VDB (Van Den Bergle) test (Mallay and Evelyn)
17 Perform icteues index, thymol turbidity, cephalin cholesterol flocculation
18 Perform BSP (Bromsulfonphthalien) test

(TASK STATEMENT) PERFORM GLUCOSE TEST BY NELSON – SAMOGYI METHOD

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Sample of serium, plasma, whole blood urine or CSF Test tubes Pipet Distilled water Barium hydroxide Zinc sulfate Centrifuge Folin-Wu sugar tubes Alkaline copper tartrate Boiling water bath Cold water bath Arsenomal update color reagent Glucose standard Spectrophotometer Cuvettes Graph paper Timer Heat source Controls Lab record book	Prepare protein - free filtrate Place samples in Folin-Wu tubes Perform color reactions and dilute Calibration spectrophotometer Read % T values Determine concentration from graph with mg %	Safety Reliability and accuracy of results Proper glassware handling Chemical handling Sources of error Hazards Patient's well-being hangs in balance Burns - heat plus chemical Lacerations

DECISIONS	CUES	ERRORS
Set proper wavelength Check quality control	Accurate timing is essential Reagents must be fresh Inadequate mixing	Incorrect results

(TASK STATEMENT) PERFORM GLUCOSE TEST BY NELSON-SAMOGYI METHOD

SCIENCE	MATH – NUMBER SYSTEMS
Digestion and metabalism of carbohydrates Chemistry of carbohydrates Blood sugar homeostasis Kidney, liver, pancreas function Glucose tolerance theory Normal values and glucose curves Protein free filtrates Proper specimen collection times plus preservation Chemical reactions of test procedures Diabetes mellitus Renal threshold	Measure of metric volume and weight Read graph Dilutions Ratio and proportions Liquid and dry measures (metrics) Measure of time Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedure	Comprehension, medical terminology, description of mechanism
Writing	Report results, labels, draw graphs	Penmanship, spelling, accuracy, progress report, usage

(TASK STATEMENT) PERFORM GLUCOSE BY FOLIN-WU METHOD

TOOLS, EQUIPMENT, MATERIALS OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Test tubes Controls Flashes Whole blood Sulfuric acid Sodium tunptate Funnel Filter paper Folin-Wu blood sugar tubes Distilled water Alkaline copper tartrate Boiling water bath Heat source Cold water bath Molybdic acid Spectrophotometer Pipets Cuvettes Graph paper Timer Lab record book Standard glucose	Prepare Folin-Wu filtrate Place samples in Folin-Wu tubes Perform color reaction and dilute Calibrate spectrophotometer Read % T values Determine mg% from graph	Safety Reliability and accuracy of results Proper glassware handling Chemical handling Sources of error Hazards Patients well being Burns - heat and chemical Lacerations

DECISIONS	CUES	ERRORS
Select procedure	Set proper wavelength Accurate timing is essential Check quality control Inadequate mixing	Improper results

(TASK STATEMENT) PERFORM GLUCOSE BY FOLIN-WU METHOD

SCIENCE	MATH – NUMBER SYSTEMS
Digestion and metabolism of carbohydrates Chemistry of carbohydrates Blood sugar homeostasis Kidney, liver, pancreas function Glucose tolerance theory Normal values and glucose utilization curves **Protein free filtrates** Collection times and preservation Chemical reactions of tests Diabetes mellitus Renal threshold	Measure of metric volume Read graph Dilutions Basic arithmetic skills Ratio and proportions Measure of metric weights Measure of time

137

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedure	Comprehension, medical terminology, description of mechanism
Writing	Report results, labels, draw graphs	Penmanship, spelling, accuracy, progress report, usage

137

(TASK STATEMENT) PERFORM UREA NITROGEN TEST BY NESSLERIZATION

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Whole blood sample Pipet Test tubes Water bath or incubator Timer Corks Filter paper Funnels Cuvettes Spectrophotometer Nitrogen standard [$(NH_4)_2SO_4$] Controls Graph paper Urease solution Urea solution Sulfuric acid Sodium tungstate Nesslers reagent Distilled water Lab record book	Incubate blood with urease Prepare protein free filtrates Develop color Calibrate spectrophotometer Read % T values Determine concentration from graph in mg %	Safety Reliability and accuracy of results Glassware handling Chemical handling Sources of error Hazard Patient's well-being Lacerations Chemical burns
DECISIONS	**CUES**	**ERRORS**
Select time and temperature	Time and temperature must be accurate Wavelength setting Check quality control Make fresh reagent	Improper results

138

(TASK STATEMENT) PERFORM UREA NITROGEN TEST BY NESSLERIZATION

SCIENCE	MATH – NUMBER SYSTEMS
Kidney function Digestion and metabolism of proteins Kidney diseases Nitrogen substances in body Liver function Chemical reactions of test procedure Collection and preservation of specimen Enzyme reactions Normal values	Measure of metrics volume and weight Read graph Dilutions Measure of temperature Ratio and proportions Measure of time Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedure	Comprehension, medical terminology, description of mechanism
Writing	Report results, labels, draw graphs	Spelling, penmanship, accuracy, progress report, usage

(TASK STATEMENT) PERFORM URIC ACID TEST

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Serum or plasma Test tube Pipets Sulfuric acid Sodium tungstate Centrifuge Distilled water Sodium carbonate Phosphotungstic acid reagent Spectrophotometer Cuvettes Timer Uric acid standard Graph paper Lab record book Controls	Prepare Folin-Wu filtrate Develop color Calibrate spectrophotometer Read % T Determine concentration from graph in mg %	Safety Reliability and accuracy of results Glassware handling Chemical handling Hazard Patient's well-being Lacerations Chemical burns

DECISIONS	CUES	ERRORS
Select proper wave lengths	Procedure specifications	Inaccurate results

(TASK STATEMENT) PERFORM URIC ACID TEST

SCIENCE	MATH – NUMBER SYSTEMS
Kidney function Digestion and metabolism of proteins Nitrogen substances in body Chemical reactions of test procedure Normal values Kidney diseases Liver function	Measure of metric volume Ratios and proportions Read graph Dilutions Measure of time Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedure	Comprehension, medical terminology, description of mechanism
Writing	Report results, labels, draw graphs	Penmanship, spelling, accuracy, progress report, usage

(TASK STATEMENT) PERFORM CREATININE TEST (FOLIN METHOD)

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Serum or plasma Water Sodium tungstate Sulfuric acid Test tubes Pipets Centrifuge Cuvette Spectrophotometer Timer Creatinine standard Graph paper Lab record book Controls Picric acid Sodium hydroxide	Prepare Folin-Wu filtrate Develop color Calibrate spectrophotometer Read % T values Determine concentration from graph in mg %	Safety Reliability and accuracy of results Glassware handling Chemical handling Picric acid is volatile when hot Hazard Patient's well-being Lacerations Chemical burns Picric acid stains

DECISIONS	CUES	ERRORS
Determine if test is complete	Check quality control Check wavelength Fresh reagents Procedure specification	Improper results

(TASK STATEMENT) PERFORM CREATININE TEST (FOLIN METHOD)

SCIENCE	MATH – NUMBER SYSTEMS
Chemical reactions of test Jaffe reaction Kideny fucntion Digestion and metabolism of protiens Nitrogen substances in body Nitrogen substances in body Kidney diseases Normal values	Ratios and proportions Measure of metric volume Read graph Dilutions Measure of time Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedure	Comprehension, medical terminology, description of mechanism
Writing	Report results, labels, draw graphs	Penmanship, spelling, accuracy, progress report, usage

(TASK STATEMENT) PERFORM TOTAL PROTEIN, ALBUMIN, GLOBULIN TEST (BIURET METHOD) (TP/AG)

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Serum or plasma Cuvettes Test tubes Sodium hydroxide Biuret reagent Spectrophotometer Protein standard Graph paper Controls Lab record book Timer Sulfate - sulfite solution Ether diethyl Centrifuge Pipets	Mix sample and NaOH Mix sample and sulfate - sulfite solution Extract globulins by shaking Centrifuge Develop color Calibrate spectrophotometer Read % T values for TP and ALB Determine concentration from graph in mg % Calculate globulin and A/G ratio	Safety Reliability and accuracy of results Glassware handling Chemical handling Ether is volatile Hazard Patient's well-being Lacerations Chemical burns Explosions

DECISIONS	CUES	ERRORS
Determine endpoint	Shaking time and strength critical Do not disturb globulin layer Check quality control Check wavelength Hemolysis of sample should be avoided	Improper results

(TASK STATEMENT) PERFORM TOTAL PROTEIN, ALBUMIN, GLOBULIN TEST (BIURET METHOD) (TP/AG)

SCIENCE	MATH – NUMBER SYSTEMS
Digestion and metabolism of protein Protein components and functions Nitrogen substances in body Normal values Chemical reactions of test Significance of findings	Globulin = total protein - albumin A/G = albumin/globin Measure of metric volume Ratio and proportions Read graph Dilutions Measure of time Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedure	Comprehension, medical terminology, description of mechanism
Writing	Report results, labels, draw graphs	Penmanship, spelling, accuracy, progress report, usage

(TASK STATEMENT) PERFORM CHOLESTEROL TEST

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Serum Volumetrics flask Funnel Filter paper Stoppers Acetone - alcohol Beaker Pipets Heat source Glacial acetic acid Ferric chloride Cuvettes Spectrophotometer Cholesterol standard Timer Lab record book Controls Graph paper	Prepare filtrate Evaporate to dryness Develop color Calibrate spectrophotometer Read % T values Determine concentration from graph in mg %	Reliability and accuracy of results Glassware handling Chemical handling Alcohol-acetone is flammable Hazard Patient's well-being Lacerations Chemical burns Fire

DECISIONS	CUES	ERRORS
Determine endpoint	Dry equipment Do not scorch residue Evaporation occurs easily Check quality control Check wavelength	Improper results

(TASK STATEMENT) PERFORM CHOLESTEROL TEST

SCIENCE	MATH – NUMBER SYSTEMS
Digestion and metabolism of fats Interpretation of results Chemical reaction of tests Kidney function and diseases Liver function and diseases Types of lipids and functions	Measure of metric volume Ratios and proportions Read grpah Dilutions Measure of time Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedures	Comprehension, medical terminology, description of mechanism
Writing	Report results, labels, draw graphs	Penmanship, spelling, accuracy, progress report, usage

(TASK STATEMENT) PERFORM CHLORIDE TEST (SCHOLES AND SCHOLES)

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Serum Water Test tube Sulfuric acid Sodium tungstate Funnel Filter paper Flask, erlenmyer Diphenyl carbonzone Mercuric nitrate Standard sodium chloride Burette Lab record book Controls	Prepare Folin-Wu filtrate Titrate with mercuric nitrate Calculate results in mg% and/or meg/l Titrate standard NaCl	Safety Reliability and accuracy of results Glassware handling Chemical handling Sources of error Hazard Patient's well-being Lacerations Chemical burns

DECISIONS	CUES	ERRORS
Determine standards for accuracy	Check quality control	Incorrect results

(TASK STATEMENT) PERFORM CHLORIDE TEST (SCHOLES AND SCHOLES)

SCIENCE	MATH – NUMBER SYSTEMS
Electrolyte balance in body Water balance Chemical reactions of tests Titration procedures Normal values Endocrine system - adrenals	Conversion of milliequivalents - mg% Ml $Hg(NO_3)_2$ x 100/A = meg/liter Ml $Hg(NO_3)_2$ x 100/A x 5.85 = mg/100ml A= ml to titrate standard NaCl Measure of metric volume Ratio and proportion Dilution Basic arithmetic skills

(671)

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedures	Comprehension, medical terminology, description of mechanism
Writing	Report results, labels, draw graphs	Penmanship, spelling, accuracy, progress report, usage

(TASK STATEMENT) PERFORM CARBON DIOXIDE (CO_2) DETERMINATION (VAN SLYKE)

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Serum Van Slyke apparatus Mercury Distilled water Caprylic alcohol Lactic or sulfuric acid Pipet Lab record book	Prepare apparatus Add reagents and serum Release CO_2 Measure volume Calculate volume % at STP conditions	Safety Mercury Glassware handling Hazard Lacerations Chemical burns
DECISIONS Determine standards for accuracy	**CUES** Measure temperature and pressure Clear of water and air	**ERRORS** Incorrect results

051

(TASK STATEMENT) PERFORM CARBON DIOXIDE (CO_2) DETERMINATION (VAN SLYKE)

SCIENCE	MATH – NUMBER SYSTEMS
Electrolyte balance in body Acidosis and alkalosis Gas laws Chemical reactions of test Manometric determinations Normal values Water balance Endocrine system - adrenals	Metric measure of volume Connect to STP conditions Measure of temperature Measure barometric pressure Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedures	Comprehension, medical terminology, description of mechanism
Writing	Report results, labels, draw graphs	Penmanship, spelling, accuracy, progress report, usage

(TASK STATEMENT) PERFORM SODIUM AND POTASSIUM DETERMINATION (FLAME PHOTOMETER)

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Serum Distilled water Buffer solutions Standard solutions Volumetric flask Pipets Gas source - propane Air source Controls	Set-up photometer Calibrate Read Na and K values	Safety Reliability and accuracy of results Flow meter Open flame Hazard Lacerations Burns

DECISIONS	CUES	ERRORS
Determine standards for accuracy	Check quality control Contamination of buffers and standards	Incorrect results

(TASK STATEMENT) PERFORM SODIUM AND POTASSIUM DETERMINATION (FLAME PHOTOMETER)

SCIENCE	MATH – NUMBER SYSTEMS
Electrolyte balance in body Buffer systems Water balance Endocrine system - adrenals	Mg % – meg/l Measure of metric volume

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedures	Comprehension, medical terminology, description of mechanism
Writing	Report results, labels, draw graphs	Penmanship, spelling, accuracy, progress report, usage

153

(TASK STATEMENT) PERFORM CALCIUM TEST (CLARK-CALLIP)

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Serum Distilled water Ammonium oxalate Graduated centrifuge tube Centrifuge Filter paper Ammonium hydroxide Sulfuric acid Pipets Boiling water bath Heat source Potassium permanganate Timer Lab record book Controls	Precipitate oxalate Centrifuge and drain Heat Titrate with $KMNO_4$ Titrate blank Calculate mg % Ca	Safety Sources of error Reliability and accuracy of results Glassware handling Chemical handling Hazard Patient's well-being Lacerations Stains Burns
DECISIONS	**CUES**	**ERRORS**
Determine standards for accuracy	Reciprocal relation between calcium and phosphorus Check quality control	Incorrect results

(TASK STATEMENT) PERFORM CALCIUM TEST (CLARK - CALLIP)

SCIENCE	MATH – NUMBER SYSTEMS
Electrolyte balance Chemical reactions of test Normal values Titration mechanism Endocrine system - parathyroid, thyroid Vitamin metabolism	1 ml $KMNO_4$=0.2 mg Ca Ml $KMNO_4$ needed – ml $KMNO_4$ for blank x 0.2 x 100/2 = mg Ca/100ml Metric measure of volume Basic arithmetic skills Measure of temperature Measure of time

COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedures	Comprehension, medical terminology, description of mechanism
Writing	Report results, labels, draw graphs	Penmanship, spelling, accuracy, progress report, usage

(TASK STATEMENT) PERFORM INORGANIC PHOSPHOROUS TEST

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Serum Graduated centrifuge tube Pipets Trichloracetic acid Funnel Filter paper Test tubes Molybdate II Amino naphthol sulfuric acid (ANS) Distilled water Standard KH_2PO_4 Spectrophotometer Cuvettes Controls Lab record book Timer Graph paper	Prepare filtrate Develop color Calibrate spectrophotometer Read % T value Determine mg % from graph	Safety Reliability and accuracy of results Proper glassware handling Chemical handling Sources of error Hazard Patient's well-being Burns Lacerations

DECISIONS	CUES	ERRORS
Determine standards for accuracy	Check quality control Set proper wavelength Avoid hemolysis	Incorrect results

951

(TASK STATEMENT) PERFORM INORGANIC PHOSPORUS TEST

SCIENCE	MATH – NUMBER SYSTEMS
Electrolyte balance Chemical reaction of test Normal values Endocrine system - parathyroid, thryoid Vitamin metabolism Vitamin deficiency diseases	Measure of metric volume Dilutions Basic arithmetic skills Ratios and proportions Liquid and dry measures Measure of time Read graph

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedures	Comprehension, medical terminology, description of mechanism
Writing	Report results, labels, draw graphs	Penmanship, spelling, accuracy, progress report, usage

(TASK STATEMENT) PERFORM AMYLASE TEST (SAMOGYI METHOD)

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Starch paste Serum Test tubes Waterbath Pipets Sulfuric acid Sodium tungstate Reagents for glucose test (Folin-Wu) Lab record book Glucose calibration graph Timer	Incubate serum and substrate Prepare filtrate Perform glucose test Read % T on spectrophotometer Read value from glucose calibration graph	Safety Reliability and accuracy of results Glassware handling Chemical handling Sources of error Hazard Patient's well-being Lacerations Chemical burns

DECISIONS	CUES	ERRORS
Determine standards for accuracy	Must be performed soon after specimen obtained Temperature, pH, timing critical	Incorrect results

(TASK STATEMENT) PERFORM AMYLASE TEST (SAMOGYI METHOD)

SCIENCE	MATH – NUMBER SYSTEMS
Carbohydrate digestion and metabolism Function of pancreas Chemical reactions of test Enzyme function and activity Pancreas pathology and diseases Liver function Amylase function	1 amylase unit = 1 mg % sugar Measure of metric volume and weight Read graphs Dilutions Measure of temperature Ratios and proportions Measure of time Basic arithmetic skills

151

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedure	Comprehension, medical terminology, description of mechanism
Writing	Report results, label, draw graphs	Penmanship, spelling, accuracy, progress report, usage

159

(TASK STATEMENT) PERFORM SGOT, SGPT, LDH TESTS (SIGMA)

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Serum Substrate (Sigma) Waterbath Centrifuge tubes, graduated Timer Color reagent (Sigma) Sodium hydroxide Spectrophotometer Control serum Standard solution Graph paper Cuvettes Lab record book	Incubate serum and substrate Develop color Calibrate spectrophotometer Read % T value Determine concentration from graph in Sigma-Frankel units	Safety Reliability and accuracy of results Glassware handling Chemical handling Sources of error Hazard Patient's well-being Lacerations Chemical burns
DECISIONS	**CUES**	**ERRORS**
Determine standards for accuracy	Time and temperature critical Check wavelength Check quality control	Incorrect results

(TASK STATEMENT) PERFORM SBOT, SGPT, LDH TESTS (SIGMA)

SCIENCE	MATH – NUMBER SYSTEMS
Chemical reactions of tests Enzyme function and activity Heart function Myocardial infarctions Liver function Pulmonary infarctions Preservation of samples Enzyme curves	Measure of metric volume and weight Read graphs Dilutions Measure of temperature Ratios and proportions Measure of time Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedure	Comprehension, medical terminology, description of mechanism
Writing	Report results, label, draw graphs	Penmanship, spelling, accuracy, progress report, usage

(TASK STATEMENT) PERFORM ALKALINE AND ACID PHOSPHATASE TESTS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Serum Alkaline or acid substrate Water bath or incubator Distilled water Trichloracetic acid Funnel Filter paper Graduated centrifuge tube Molybdate II solution ANS Pipets Spectrophotometer Cuvettes Graph paper Standard KH_2PO_4 Controls Lab record book	Prepare filtrate Incubate Develop color Calibrate spectrophotometer Read % T value Determine concentration from graph in B units Perform inorganic phosphorus test	Safety Reliability and accuracy of results Glassware handling Chemical handling Sources of error Hazard Patient's well-being Lacerations Chemical burns

DECISIONS	CUES	ERRORS
Determine standards for accuracy	Time, substrate, temperature, pH critical Check quality control Check wavelength	Incorrect results

(TASK STATEMENT) PERFORM ALKALINE AND ACID PHOSPHATASE TESTS

SCIENCE	MATH – NUMBER SYSTEMS
Function of enzymes and activity Normal values Chemical reactions of tests Optimum conditions for enzyme tests Prostatic carcinoma Bone diseases	Phosphatase - inorganic phosphorus = Alkaline or acid phosphatase Measure of temperature 1 B unit = 1 mg phosphorus/100 ml serum/ 1 hour Measure of metric volume and weight Read graph Dilutions Measure of temperature Ratios and proportions Measure of time Basic arithmetic skills

163

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedure	Comprehension, medical terminology, description of mechanism
Writing	Report results, label, draw graphs	Penmanship, spelling, accuracy, progress report, usage

(TASK STATEMENT) PERFORM VDB (VAN DEN BERGLE) TEST (MALLAY AND EOELYN)

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Serum Large test tubes Distilled water Methyl alcohol Hydrochloric acid Sulfanilic acid Sodium nitrite Timer Spectrophotometer Cuvettes Graph paper Standard bilirubin Lab record book	Set up color reaction Calibrate spectrophotometer Read direct reaction Read indirect reaction Determine mg% from graph	Safety Reliability and accuracy of results Proper glassware handling Chemical handling Sources of error Hazard Patient's well-being Burns Lacerations

DECISIONS	CUES	ERRORS
Determine standards for accuracy	Reagents must be fresh Timing is critical Avoid hemolysis	Incorrect results

(TASK STATEMENT) PERFORM VDB (VAN DEN BERGLE) TEST (MALLAY AND EOELYN)

SCIENCE	MATH – NUMBER SYSTEMS
Digestion and metabolism of food Liver function Red cell breakdown Liver diseases Chemical reactions of test Normal values Bile formation and function	Measure of metric volume Dilutions Basic arithmetic skills Ratios and proportions Measure of metric weight Measure of time Read graph

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedure	Comprehension, medical terminology, description of mechanism
Writing	Report results, label, draw graphs	Penmanship, spelling, accuracy, progress report, usage

(TASK STATEMENT) PERFROM ICTEUES INDEX, THYMOL TURBIDITY, CEPHALIN CHOLESTEROL FLOCCULATION

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Serum A Test tubes Sodium citrate Standard potassium dichromate Spectrophotometer Cuvettes Pipettes B Test tubes Buffered thymol Pipettes C Centrifuge tubes, clear Isotonic saline Pipettes Ceph floc antigen Cotton Lab record book	A Icteues index 1. Dilute serum 2. Read O.D. of standard and test 3. Calculate value B Thymol turbidity 1. Mix reagents 2. Read turbidity C Ceph Floc 1. Mix reagents 2. Let stand in dark 3. Read flocculation	Safety Reliability of results Chemical handling Glassware handling Sources of error Hazard Patient's well-being Contamination Lacerations

DECISIONS	CUES	ERRORS

9711

(TASK STATEMENT) PERFORM ICTEUES INDEX, THYMOL TURBIDITY, CEPHALIN CHOLESTEROL FLOCCULATION

SCIENCE	MATH – NUMBER SYSTEMS
Digestion and metabolism of foods Liver function and diseases Red cell breakdown Chemical reactions of tests Normal values Interpretation of results Bile formation and function	$\frac{\text{OD unknown}}{\text{OD standard}} \times 10 = \text{Icteues index}$ Dilutions Basic arithmetic skills Ratios and proportions Measure of time Metric measure of volume

L91

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedure	Comprehension, medical terminology, description of mechanism
Writing	Report results, label, draw graph	Penmanship, spelling, accuracy, progress report, usage

(TASK STATEMENT) PERFORM BSP (BROMSULFONPHTHALIEN) TEST

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARDS
BSP dye Serum sample Venipuncture equipment Sodium hydroxide Hydrochloric acid Pipettes Spectrophotometer Cuvettes Distilled water Graph paper Lab record book Timer	Calculate volume dye needed (mg/kg body weight) Administer dye Draw blood after 45 - 60 seconds Develop color Calibrate spectrophotometer Read % T Determine mg % dye from graph	Safety Reliability and accuracy of results Proper glassware handling Chemical handling Proper amount dye Hazards Patient's well-being Lacerations

DECISIONS	CUES	ERRORS
Determine standards for accuracy	Technician does not inject dye generally Timing accuracy is essential Blood sample should be drawn from opposite arm from where dye injected	Incorrect results

291

(TASK STATEMENT) PERFORM BSP (BROMSULFONPHTHALIEN) TEST

SCIENCE	MATH – NUMBER SYSTEMS
Function of BSP dye Liver function Red cell breakdown Liver diseases Bile formation and function Digestion and metabolism Chemical reactions of tests	Basic arithmetic skills Measure with the Metric and English system and convert between them Ratio and proportions [mg dye/kilogram body weight] Measures of weight Measure of metric volume Measure of time Read graph

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedure	Comprehension, medical terminology, description of mechanism
Writing	Report results, label, draw graph	Penmanship, spelling, accuracy, progress report, usage

Duty G Performing Urinalysis

1 Collect and preserve urine specimens
2 Determine physical characteristics of urine
3 Determine pH of urine
4 Determine specific gravity of urine
5 Determine glucose in urine
6 Determine protein in urine
7 Determine presence of ketone bodies in urine
8 Perform test for bile and urobilinogen in urine
9 Perform test for blood in urine and feces
10 Perform microscopic examination of urine
11 Perform renal function test

170

(TASK STATEMENT) COLLECT AND PRESERVE URINE SPECIMENS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Clean urine bottle or cup and lid	Collect random specimen (voided or catheterized) Collect 24 hour specimen Perserve 24 hour specimen refrigeration toluene thymol formalin	Hazard Contamination
DECISIONS	**CUES**	**ERRORS**
Determine standards for accuracy	Test requested determines time specimen taken Fresh specimen use prevents decomposition Unless specimen is preserved, test should be run within 1-2 hours Catheterized specimens needed for bacteriologic examination First morning specimen is usually best	Poor quality sample Contamination

(TASK STATEMENT) COLLECT AND PRESERVE URINE SPECIMENS

SCIENCE	MATH – NUMBER SYSTEMS
Composition of urine Anatomy and physiology of urinary system Normal quantity of urine Effects of diet on urine	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Requisitions	Comprehension, medical terminology

(TASK STATEMENT) DETERMINE PHYSICAL CHARACTERISTICS OF URINE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Urine specimen Laboratory record book Graduated glassware	Determine volume Observe and distinguish color Assess transparency Determine odor	Safety Wash hands Hazard Contamination

DECISIONS	CUES	ERRORS
Determine need for further testing	Physical characteristics can give clues to findings in other portions of urinalysis When abnormal characteristics are found, certain other tests are indicated	Unnecessary tests Fail to perform needed tests

(TASK STATEMENT) DETERMINE PHYSICAL CHARACTERISTICS OF URINE

SCIENCE	MATH – NUMBER SYSTEMS
Anatomy and physiology of urinary system Causes and characteristics of abnormal results Quantity of urine excretion Urinary pigments	Metric system measure of volume

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing	Results Specimen	Comprehension, technical terminology Visual analysis, Color discrimination

(TASK STATEMENT) DETERMINE pH OF URINE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Urine specimen Lab record book Combistix Bililabstix Nitiazine paper Reference color charts	Use combistix (ames) Use Bililabstix (ames) Use nitrazine paper Compare with color charts	

SL1

DECISIONS	CUES	ERRORS
Determine standards for accuracy	pH changes after specimen stands pH can give clue to microscopic identification Alkaline pH can cause dissolving of some elements	Improper results

(TASK STATEMENT) DETERMINE pH OF URINE

SCIENCE	MATH – NUMBER SYSTEMS
Kidney function Hydrogen ion concentration Acid-base theories Effects of pH on body Normal = 5-7	Scientific notation

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing Viewing	Results Color charts	Comprehension, medical terminology Penmanship, detail/inference Visual analysis, Color discrimination

(TASK STATEMENT) DETERMINE SPECIFIC GRAVITY OF URINE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Urine specimen Urinometer Hydrometer jar Lab record book Clinical refractometer Distilled water Thermometer	Calibrate urinometer Correct for temperature Read specific gravity on urinometer Correct for glucose present Use refractometer	Safety Urinometers are fragile Contain mercury Hazard Mercury vapors Lacerations

DECISIONS	CUES	ERRORS
Select urinometer Determine standards for accuracy	Bubbles in urine can cause errors in reading Urinometer must float free off the bottom of the container Read on flat surface at eye level Read at bottom of meniscus	No reading

LL1

(TASK STATEMENT) DETERMINE SPECIFIC GRAVITY OF URINE

SCIENCE	MATH – NUMBER SYSTEMS
Kidney function Density Specific gravity Formation of solutions Urinary physiology Relationship of volume and pH Osmolality Refractive index Meniscus	$\frac{\text{Weight of solution}}{\text{Weight of water}}$ = Specific gravity Temperature correction = .001/degree above or below calibration level Glucose correction = .003/1 gm glucose Temperature measurement

COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading		Comprehension, medical terminology
Writing	Report results, note correction	Progress report, spelling, terminology, logic
Viewing	Specimen	Visual analysis, Detail/inference

(TASK STATEMENT) DETERMINE GLUCOSE IN URINE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Urine specimen Clinitest tablets Tes-tape Clinistix Bililabstix Benedict's qualitative reagent (copper sulfate, sodium citrate, sodium carbonate, distilled water) Test tube Boiling water bath Reference color charts Lab record book Cold water bath Timer Water pipets Quantitative test: Benedicts quantitative reagent Sodium carbonate Heat source Water Pipet Test tubes	Non-specific tests - reducing activity Benedict's qualitative test Clinitest (Ames) Specific tests - using enzyme oxidase Tes-tape (Eli Lilly) Clinistix (Ames) Bililabstix (Ames) or Combistix (Ames) Report intensity of color change Quantitative tests (24 hour specimen) Benedict's quantitative Read results	Safety Keep bottles of stix and tablets tightly closed Hazard Deterioration of chemicals

DECISIONS	CUES	ERRORS
Determine standards for accuracy	Accurate timing is critical Read procedures carefully Clinitest can pass through 4 plus results to show higher value; watch as reaction occurs	Incorrect results

(TASK STATEMENT) DETERMINE GLUCOSE IN URINE

SCIENCE	MATH – NUMBER SYSTEMS
Carbohydrate digestion and assimilation Chemical reactions in testing Diabetes - causes, symptoms , diagnosis, results Kidney function - absorption Renal threshold concept	Quantitative glucose $\frac{1}{\text{cc urine}}$ = % glucose $\frac{\text{Total volume}}{\frac{\text{cc urine}}{100}}$ = gms/24 hours Metric system measure of volume Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedures supplied with tablets and sticks carefully	Comprehension, detail/inference, medical terminology
Writing	Record results	Penmanship, spelling, logic

(TASK STATEMENT) DETERMINE PROTEIN IN URINE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Urine specimen Centrifuge Centrifuge tubes Water Sodium chloride Glacial acetic acid Boiling water bath Timer Cold water bath Bumintest tablets Sodium sulfate Sulfsalicylic acid Standards Test tubes Albutest tablets Albustix Combistix Bililabstix	Perform heat and acetic acid test Perform Bumintest (Ames) Perform Sulfosalicylic acid test Perform Albutest (Ames) Perform Albustix (Ames) Perform Combistix or Bililabstix Read results	

DECISIONS	CUES	ERRORS
Turbidity comparison	Presence of protein can indicate findings in sediment Mucin interferes with protein tests	

(TASK STATEMENT) DETERMINE PROTEIN IN URINE

SCIENCE	MATH – NUMBER SYSTEMS
Kidney function Filtration and reabsorption - urine formation Diseases causing protein occurrence Chemical reactions of protein tests Protein digestion and assimilation	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Literature supplied by manufacturer Record results	Comprehension, medical terminology Penmanship, spelling

(TASK STATEMENT) DETERMINE PRESENCE OF KETONE BODIES IN URINE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Urine specimen Sodium nitroprusside Ammonium sulfate Ammonium hydroxide Test tubes Acetest tablets Ketostix 10% ferric chloride Timer Heat source	Perform Rothera's test Use acetest (Ames) Use Ketostix (Ames) Perform Jerhardt's test Read results	

DECISIONS	CUES	ERRORS
Determine standards for accuracy	These tests are performed when glucose is positive Timing is critical	Incorrect results

(TASK STATEMENT) DETERMINE PRESENCE OF KETONE BODIES IN URINE

SCIENCE	MATH – NUMBER SYSTEMS
Digestion and assimilation of fats Diabetes mellitus causes and effects Types of ketone bodies Physiologic effects of ketone accumulation Chemical reactions of tests	Dilutions Metric system measure of volume

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Literature supplied by manufacturer Record results	Comprehension, medical terminology Penmanship, spelling

(TASK STATEMENT) PERFORM TEST FOR BILE AND UROBILINOGEN IN URINE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Urine specimen Lab record book Fouchet's reagent Barium chloride paper Ictotest (Ames) Water Color comparison chart Ehrlich's reagent Sodium acetate Chloroform Butanol Test tube Separatory funnel Graduated glassware Bililabstix	Perform Harrison's test Use Ictatest tablets (Ames) Perform Ehrlich's qualitative test for urobilinogen Use Bililabstix (Ames) Read results	Safety Chemicals used in Ehrlich's test chlorinated are aromatic solvents Hazard Inhalation of chemical fumes
DECISIONS	**CUES**	**ERRORS**
Select timing device	Color of urine indicates need to perform test for bile Timing is critical	Misread results Improper timing

(TASK STATEMENT) PERFORM TEST FOR BILE AND UROBILINOGEN IN URINE

SCIENCE	MATH – NUMBER SYSTEMS
Kidney function Digestive system RBC breakdown process Chemical reactions of RBC destruction Chemical reactions of tests for bile Liver function	Metric system measure of volume

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Literature supplied by manufacturer Record results	Comprehension, medical terminology Penmanship, spelling

(TASK STATEMENT) PERFORM TEST FOR BLOOD IN URINE AND FECES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Urine specimen or feces Lab record book Glacial acetic acid Hydrogen peroxide Gum guaiac Ethanol Filter paper Dropping tube Hemastix Hematest Color comparison charts Bililabstix	Perform gum guaiac test Use Hemastix (Ames) Use Hematest tablets (Ames) Use Bililabstix (Ames) Read results	Safety Use chemicals with care Hazard Burns

DECISIONS	CUES	ERRORS
Identify blood	Many chemical substances, if present, interfere with these tests	Misread sample

(TASK STATEMENT) PERFORM TEST FOR BLOOD IN URINE AND FECES

SCIENCE	MATH – NUMBER SYSTEMS
Kidney function RBC morphology and breakdown Chemical reactions of tests	Metric measure of volume

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Literature supplied by manufacturer Record results	Comprehension, medical terminology Penmanship, spelling

(TASK STATEMENT) PERFORM MICROSCOPIC EXAMINATION OF URINE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Urine specimen Centrifuge Centrifuge tubes Glass slides Cover slip Microscope Lab record book	Centrifuge specimen Decant supernatant Place sediment on slide Examine microscopically Identify normal and abnormal constituents under high and lower power and estimate number	Hazard Scratched or cracked lens Broken slides

DECISIONS	CUES	ERRORS
Select equipment and procedure Identify type of crystals	Remove amorphous before centrifugation Standing of urine cause distortion or breakdown of sediment	Misread sample

(TASK STATEMENT) PERFORM MICROSCOPIC EXAMINATION OF URINE

SCIENCE	MATH – NUMBER SYSTEMS
Kidney physiology and anatomy Digestion process Characteristics, morphology of biologic and chemical sediment Blood cells Casts Crystals Epithelial cells Bacteria Miscellaneous substances	Counting sequentially

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading		Comprehension, medical terminology
Writing	Record results	Penmanship, spelling, accuracy
Viewing	Specimen	Visual analysis, Detail/inference

(TASK STATEMENT) PERFORM RENAL FUNCTION TEST

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Properly collected urine specimens 1000 ml graduated cylinder Water Sodium hydroxide Spectrophotometer Graph paper Urinometer Hydrometer jar Lab record book	Perform PSP (Phenolsulf on phthalein) test Measure volume Adjust pH Calibrate spectrophotometer Read % T of unknowns Determine value from graph Perform Mosenthal's Concentration Test Measure volume Measure specific gravity	Safety Sodium hydroxide is corrosive Hazard Burns

DECISIONS	CUES	ERRORS

(TASK STATEMENT) PERFORM RENAL FUNCTION TESTS

SCIENCE	MATH – NUMBER SYSTEMS
Kidney function Absorption and filtration Liver function Hydrogen ion concentration Water balance in body Specific gravity and density Kidney pathology	Draw graph Metric measure of volume Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Graph Record results	Comprehension, medical terminology Penmanship, spelling, accuracy

Duty H Performing Bacteriology Procedures

1 Sterilize equipment and supplies
2 Prepare culture media
3 Innoculate culture media
4 Incubate cultures
5 Determine culture morphology
6 Prepare bacterial slides
7 Stain slides using gram stain
8 Determine microscopic morphology
9 Identify bacteria
10 Determine drug sensitivity

193

(TASK STATEMENT) STERILIZE EQUIPMENT AND SUPPLIES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Equipment Glassware Used or contaminated equipment Autoclave Burner (Bunsen or alcohol) Water source 75% alcohol Soap solution Internal timer	Sterilize transfer needles and loops by burning Wrap small equipment and supplies Autoclave at 121°C for 15 - 20 minutes at 15 pounds pressure	Safety Open fire Pressure in autoclave and heat Glassware can be broken Improper sterilization will not kill bacteria Hazard Burns Explosion Lacerations Bacterial contamination

DECISIONS	CUES	ERRORS
Select methods of sterilization Select autoclave	Method used depends on nature of material Use of autoclave (steam under pressure) is most effective	Contamination

(TASK STATEMENT) . STERILIZE EQUIPMENT AND SUPPLIES

SCIENCE	MATH - NUMBER SYSTEMS
Resistance of microorganisms to sterilization Gas laws Effect of chemicals on microorganisms	Measure of temperature [to include Kelvin] Ratio and proportion

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Thermometer, gauge	Detail/inference

(TASK STATEMENT) PREPARE CULTURE MEDIA

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Dehydrated media Distilled water Balance Weighing paper or dish Volumetric glassware Autoclave Water source Petri dishes Sterile tubes Plugs Nutrient additives, i.e. blood Heat source Beakers Stirring device	Accurately weigh correct amount of dehydrated media Dilute accurately Sterilize Pour plates or tubes agar slants broth tubes agar plates fermentation tubes Use sterile transfer technique Store in refrigerator	Safety Use sterile techniques Hazard Burn Lacerations Contaminated plates

DECISIONS	CUES	ERRORS
Determine type media nedessary	Use of media Shelf-life of prepared media Accurate timing is essential Denaturization of sugars at elevated temperature and pressure	Media will not set-up

961

(TASK STATEMENT) PREPARE CULTURE MEDIA

SCIENCE	MATH – NUMBER SYSTEMS
Cultural requirements of bacteria Selective, differential and enrichment media characteristics	Proportions and ratios Percent measures Measures of metric volume Measure of metric weight

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Directions for preparation on media	Comprehension, medical terminology

(TASK STATEMENT) INNOCULATE CULTURE MEDIA

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Culture specimen Media Bunsen burner or alcohol lamp Transfer loop or needle	Determine appropriate culture media Sterilize loop or needle, tube lips Use sterile technique for transfer Use appropriate innoculation techniques	Safety Sterile techniques must be utilized Hazard Burns Bacterial contamination

DECISIONS	CUES	ERRORS
Select innoculation technique	Media used dependent on type specimens Innoculation techniques is dependent on type media	Improper culture growth

(TASK STATEMENT) INNOCULATE CULTURE MEDIA

SCIENCE	MATH – NUMBER SYSTEMS
Normal and abnormal flora Characteristics of selective, differential, and enrichment media Cultural requirements of bacteria	

661

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Difco manual	Comprehension, terminology

199

(TASK STATEMENT) INCUBATE CULTURES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Properly innoculate culture media Incubator Brerver anaerobic jar	Incubute under aerobic conditions Incubate using anaerobic conditions Brerver anaerobic jar Innoculate deep in solid media Allow time for growth	Hazard Electrical shocks
DECISIONS	**CUES**	**ERRORS**
Select time and temperature	Proper temperature must be controlled Incubator must contain moisture to avoid drying out of cultures	Ruin culture

(TASK STATEMENT) INCUBATE CULTURES

SCIENCE	MATH – NUMBER SYSTEMS
Cultural requirements of bacteria Aerobic and anaerobic conditions Optimum growth requirements	Temperature measurement

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Difco manual	Comprehension, terminology

201

201

(TASK STATEMENT) DETERMINE CULTURE MORPHOLOGY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Mature culture Lab record book Hand lens or dissecting microscope Calory counter	Observe color Observe characteristics of colony, i.e. texture, shape, luminous characteristics Observe hemolysis on blood agar Observe motility Observe odor Count calories	Safety Avoid contamination Hazard Contamination of lab and culture

DECISIONS	CUES	ERRORS

(TASK STATEMENT) DETERMINE CULTURE MORPHOLOGY

SCIENCE	MATH – NUMBER SYSTEMS
Cultural characteristics of bacteria	

203

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing Viewing	Record results Mature culture characteristics	Comprehension, terminology Penmanship, spelling Visual analusis, Detail/inference, Color discrimination

203

(TASK STATEMENT) PREPARE BACTERIAL SLIDES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Slides Mature culture Wire loop or needle Bunsen burner or alcohol burner Distilled water	Make direct smears from specimen Make smears from both cultures Emulsify growth from plate in water on slide Air-dry and fix with heat	Safety Use proper sterile technique Hazards Burns Lacerations from slides Contamination of lab and culture

DECISIONS	CUES	ERRORS
Select procedure and storage	Excessive heating can destroy bacteria Single layer sample desirable	Lost slide

(TASK STATEMENT) PERPARE BACTERIAL SLIDES

SCIENCE	MATH – NUMBER SYSTEMS
Effects of heat on microorganisms	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Labels	Comprehension, terminology Penmanship, spelling, accuracy

(TASK STATEMENT) STAIN SLIDES USING GRAM STAIN

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Fixed slide Staining rack Timer Blotting paper Crystal violet Ethyl alcohol Ammonium oxalate Distilled water Iodine solution Safranin Acetone Squeeze bottles Microscope Immersion oil Lab record book	Follow gram-stain procedures Air dry Examine microscopically under oil immersion	Safety Stains are toxic and flammable Wear protective devices Hazard Fumes Dyes stain hand and clothes Fire
DECISIONS	**CUES**	**ERRORS**
Determine standards for accuracy	Proper timing is essential Thorough washing necessary Avoid direct contact with slides Culture must be within the 18 - 24 hour period	Poor quality slide Over stained Under stained

(TASK STATEMENT) STAIN SLIDES USING GRAM STAIN

SCIENCE	MATH – NUMBER SYSTEMS
Gram positive and gram negative differentiation Chemical reactions of stains with bacteria	Measurement of time Basic arithmetic skills

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Staining procedure Record results	Comprehension, terminology Penmanship, spelling, accuracy

(TASK STATEMENT) DETERMINE MICROSCOPIC MORPHOLOGY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Stained slide Microscope Immersion oil Lab record book	Classify gram reaction (gram + or -) Observe size shape arrangement of cells internal cellular structure	Safety Use microscope correctly Hazard Cracked or scratched microscope lens
DECISIONS	**CUES**	**ERRORS**
Identify proper sample	Visual observation	Misread sample

(TASK STATEMENT) DETERMINE MICROSCOPIC MORPHOLOGY

SCIENCE	MATH – NUMBER SYSTEMS
Microscopic bacterial morphology	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing Viewing	Record results Morphology of cell	Comprehension, terminology Penmanship, spelling Visual analysis, Detail/inference

(TASK STATEMENT) IDENTIFY BACTERIA

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD 210
Selective and differential media Culture specimen Culture characteristics Microscopic characteristics	Determine culture morphology Determine microscopic morphology Determine staining characteristics Determine chemical reactiveness Determine differential media reaction Determine optimum culturing temperature Organize flow chart Classify	Safety Use sterile technique Hazard Contamination of lab and culture

DECISIONS	CUES	ERRORS
Classify bacteria	Bacteria patterns	Misread sample

(TASK STATEMENT) IDENTIFY BACTERIA

SCIENCE	MATH – NUMBER SYSTEMS
Classification of bacteria Characteristics of bacteria Normal flora Pathological organisms	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Difco manual Handbook of microbiology	Comprehension, technical terminology, vocabulary
Writing	Record results	Penmanship, spelling, accuracy
Viewing	Characteristics of bacteria	Visual analysis, Detail/inference

(TASK STATEMENT) DETERMINE DRUG SENSITIVITY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Pure culture Sensitivity discs	Streak plate with pure culture Add sensitivity discs Incubate Read zone of sensitivity to drugs	Safety Use sterile techniques Hazard Contamination of culture and lab

DECISIONS	CUES	ERRORS
Determine type of sensitivity disc	Type of drug	Improper results

(TASK STATEMENT) DETERMINE DRUG SENSITIVITY

SCIENCE	MATH – NUMBER SYSTEMS
Bacterial reaction to drugs Normal flora	Use metric measure of length

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Reference material Record results	Comprehension, technical terminology Penmanship, spelling

213

Duty I Performing Blood Bank and Serology Procedures

1 Perform ABO typing
2 Perform Rh typing
3 Crossmatch
4 Perform VDRL

214

(TASK STATEMENT) PERFORM ABO TYPING

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Saline - isotonic Blood sample Anti-A typing sera Anti-B typing sera Slide Test tubes Microscope Centrifuge Lab record book Pipette A cells B cells	Place blood samples in tray Add antigen Observe results	Safety Typing of blood is a life or death procedu e Hazard Transfusion reaction Death to patient
DECISIONS	**CUES**	**ERRORS**
Determine type of test technique	Type of test	Contaminated or old typing sera Incorrect cell suspension Timing insufficient Identification insufficient Low sensitivity Improper reading of agglutination Contaminated specimens Glassware dirty

(TASK STATEMENT) PERFORM ABO TYPING

SCIENCE	MATH – NUMBER SYSTEMS
Volume of blood Composition of blood History of transfusions Anticoagulant theory Inheritance of blood groups Antigen - antibody reactions Blood group systems Means of detecting antigen - antibody reactions ABO blood group system Titer Agglutination Typing sera characteristics	Proportions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Reference manuals, procedures	Comprehension, medical terminology
Writing	Record results, labels	Penmanship, spelling, accuracy
Viewing	Observe results	Visual analysis, Detail/inference

(TASK STATEMENT) PERFORM Rh TYPING

217

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Anti-Rh typing Blood sample - whole blood Test tubes Isotonic saline Incubator or water bath Microscope Pipette Slide Warning box Lab record book Timer	Slide type Tube type	Safety Typing of blood is a life or death procedure Hazard Transfusion reaction Death to patient

217

DECISIONS	CUES	ERRORS
Determine type of test technique	Type of test	Contaminated or old typing serum Incorrect temperature Incorrect cell suspension Confusion of rouleaux formation with agglutination Contaminated specimen Insufficient identification Glassware dirty

(TASK STATEMENT) PERFORM Rh TYPING

SCIENCE	MATH – NUMBER SYSTEMS
Composition of blood History of transfusions Anticoagulant theory Inheritance of blood groups Antigen - antibody reactions Rh blood group system and theory Agglutination Erythroblastosis fetalis	Measurement of temperature Proportions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Reference manuals, procedures Record results, labels	Comprehension, medical terminology Penmanship, spelling, accuracy

(TASK STATEMENT) CROSSMATCH

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Patient serum and cells Donor serum and cells Coomb's serum Test tubes Pipettes Incubator and waterbath Centrifuge Slide Microscope Lab record book Wash bottle Saline Albumin	Perform ABO typing Perform Rh typing Select matching unit Set up crossmatch saline high-protein coombs	Safety Clerical errors Organizational errors Technical errors Hazard Transfusion reactions Patient death
DECISIONS	**CUES**	**ERRORS**
Determine standards for accuracy	Detects - irregular antibodies incompatabilities labeling, identifying errors Work should be checked by another technician Timing is critical	Incorrect matching

(TASK STATEMENT) CROSSMATCH

SCIENCE	MATH – NUMBER SYSTEMS
Crossmatch theory Antigen - antibody reactions Blood group systems Composition of blood Agglutination Causes of error Glassware cleaning Selection of donors Blood derivitives Clerical work in blood bank Transfusion reactions Coomb's reaction	Ratio - proportion Measure of temperature Measure of time

220

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Reference manuals, procedures Record results, labels	Comprehension, medical terminology Penmanship, spelling, accuracy

220

(TASK STATEMENT) PERFORM VDRL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Serum samples Controls Pipettes Ring slides Flat bottom, glass stoppered bottle Syringe and needle Rotator Waterbath or incubator Microscope Lab record book Buffered saline Antigen Timer	Prepare antigen Inactivate serum Pipette serum and antigen Rotate Examine for agglutination Run positive and negative controls	Safety Use serum cautiously Hazard Technician contamination

DECISIONS	CUES	ERRORS
Select rotation time, speed and temperature Select antigen	Rotation time and speed must be exact Antigen must be prepared properly Accurate measuring essential	Misread sample Wrong antigen

(TASK STATEMENT) PERFORM VDRL

SCIENCE	MATH – NUMBER SYSTEMS
Antigen - antibody reactions Tests for syphilis Titers Immunity - resistance to disease Mechanism of reaction False negative and positive results Pathological aspects of syphilis	Ratios and proportions Measurement of volume

222

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing Viewing	Reference manuals, procedures Record results, labels Serum for agglutination	Comprehension, medical terminology Penmanship, spelling, accuracy Visual analysis, Detail/inference

222

Duty J **Performing Histology Procedures**

1 Fix tissues
2 Embedded tissue in paraffin
3 Cut thin sections and mount on slides
4 Stain tissue slides
5 Prepare frozen sections

223

(TASK STATEMENT) FIX TISSUES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD 224
Tissue specimen Auto technicon Fixing solutions	Place appropriate size tissue in auto technicon Set time limits for each solution and temperature	Safety Fixing agents must be handled correctly Hazard Inhalation of fumes Chemical burns

DECISIONS	CUES	ERRORS
Select fixation agent Determine standards for accuracy	Nature of tissue, stain to be used Process must be exact to obtain proper penetration, preserving and hardening of tissues Tissue blocks must be fairly small to allow proper fixation	Improper penetration

(TASK STATEMENT) FIX TISSUES

SCIENCE	MATH – NUMBER SYSTEMS
Tissue preservation theory Properties of fixative agents	Measurement of time

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Operating manual	Comprehension, technical terminology

(TASK STATEMENT) EMBEDDED TISSUE IN PARAFFIN

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Fixed tissue sample Paraffin Heat source Pan for embedding Cold water Forceps Knife Pencil	Melt paraffin Transfer tissue to paraffin Cool rapidly Trim blocks Mark blocks	Hazard Paraffin burns

DECISIONS	CUES	ERRORS
Determine type of media	Paraffin melts at 56° White patches are caused by clearing agent carried over from fixing process	Ruin sample

(TASK STATEMENT) EMBEDDED TISSUE IN PARAFFIN

SCIENCE	MATH – NUMBER SYSTEMS

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Procedures Labels	Comprehension, terminology Penmanship, spelling, accuracy

(TASK STATEMENT) CUT THIN SECTIONS AND MOUNT ON SLIDES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Embedded tissue Microtome Warm water bath Slides Fixative Glass pick	Cut sections on microtome Float sections in warm water Mount on slide with fixative Drain and dry Label	Safety Microtome knives are extremely sharp Hazards Lacerations Destruction of tissue
DECISIONS	**CUES**	**ERRORS**
Determine standards for accuracy	Errors are usually due to one or more causes: paraffin temperature, sharpness of knife, angle of knife	Poor mount Unusable slide

(TASK STATEMENT) CUT THIN SECTIONS AND MOUNT ON SLIDES

SCIENCE	MATH – NUMBER SYSTEMS
Surface tension Capillary adhesion Errors of cutting sections	Metric measurement of length

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Label slide	Comprehension, medical terminology Penmanship, spelling, accuracy

(TASK STATEMENT) STAIN TISSUE SLIDES

230

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Properly mounted slide Staining trays Staining jars Hematoxylin Xylol Alcohol Distilled water HCL Lithium carbonate Eosin Carbo-xylol Labels Cover slips	Follow staining procedure Mount with cover slip Label completely	Safety Use stains carefully Use glassware properly Hazards Stains dye clothes and skin Chemical inhalation Lacerations

230

DECISIONS	CUES	ERRORS
Determine type of stain and time	Accurate timing is essential Tissue characteristics	Ruin sample Poor quality slide

(TASK STATEMENT) STAIN TISSUE SLIDES

SCIENCE	MATH – NUMBER SYSTEMS
Color index for dyes Chemical reactions of staining Affinity of cells parts to stain Regressive and progressive staining	Measurement of time

231

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Procedure	Comprehension, medical terminology
Writing	Label slide	Penmanship, spelling, accuracy
Viewing	Stained slide	Visual analysis, Color discrimination

(TASK STATEMENT) PREPARE FROZEN SECTIONS

232

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Tissue Heat source Formalin Freezing microtome Water Carbon monoxide Pan of water Slide Glass pick Alcohol Hematoxylin Eosin Xylol Coverslip Label	Boil tissue in formalin Freeze Cut section Float onto slide Seal with heat Stain Coverslip Mount	Safety Use heat carefully around volatile solutions Use care in cutting Use glassware correctly Hazard Burns Fire Lacerations

DECISIONS	CUES	ERRORS
Determine quality of sample	Done for rapid preparation Done for special stains	Section too thi...

232

(TASK STATEMENT) PREPARE FROZEN SECTIONS

SCIENCE	MATH – NUMBER SYSTEMS
Fixation process Staining reactions Freezing process - chemical reactions	Measurement of time

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Procedure Label slide	Comprehension, medical terminology Penmanship, spelling, accuracy

Duty K Performing EKG

1 Prepare patient for EKG
2 Set up electrocardiograph
3 Operate electrocardiograph
4 Perform follow-up care of patient
5 Perform follow-up care of machines
6 Mount electrocardiogram

(TASK STATEMENT) PREPARE PATIENT FOR EKG

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Patient Warm, quiet room Bed Electrode jelly Strap electrodes Suction electrode	Reassure patient Situate patient in comfortable position Apply electrode jelly Fasten electrode straps to limbs Apply suction electrode to first chest position	Safety Patient should not be touching any metal objects
DECISIONS	**CUES**	**ERRORS**
Determine proper hook-up Locate lead hook-up	Patient must lie still and avoid talking Excess jelly extorts results Attach electrode to stump in case of amputation Straps should provide firm contact, but not discomfort	Improper reading

(TASK STATEMENT) PREPARE PATIENT FOR EKG

SCIENCE	MATH – NUMBER SYSTEMS
Composition of electrode jelly Purpose of EKG	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Speaking	Requisition slip Reassure patient	Comprehension Appropriate diction, clarity of expression, persuasion, gestures, poise

(TASK STATEMENT) SET UP ELECTROCARDIOGRAPH

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Prepared patient Electrocardiograph Cable cards Paper for tracing	Ground machine Allow adequate warm-up Attach cable cards to patient electrode straps Check paper	Safety Ground machine Attach leads correctly Hazard Electrical shock Interference

DECISIONS	CUES	ERRORS
Determine lead hook-up Proper operation of machine	Mix-up in lead attachments causes abnormalities in tracing Proper grounding eliminates A-C interference Oxygen tents may need to be turned off by nurse	Inaccurate reading

(TASK STATEMENT) SET UP ELECTROCARDIOGRAPH

SCIENCE	MATH – NUMBER SYSTEMS
Theory of machine operation -electronic amplifier system Galvonometer operation Styles ribbon Function of heat sensitive paper Electromotive force	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Operation manual	Comprehension

(TASK STATEMENT) OPERATE ELECTROCARDIOGRAPH

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Patient Correctly set-up electrocardiograph	Set lead selector switch Record standardization Adjust baseline Record 6 limb leads Code each lead Record 6 chest leads	Safety No X-ray or diathermy equipment must be operating near patient Check speed of paper occasionally Hazard Electrical interference

DECISIONS	CUES	ERRORS
Identify electrical interference Identify tremor Determine proper hook-up Identify improper reading	No electrical inference should be seen (sawtooth notching) Somatic tremor (irregular peaks) caused by patient tenseness Wondering baseline caused by patient movement or drag on lead wires Jittery baseline caused by poor electrical contact Poorly defined baseline caused by stylus heat, contact with paper, insufficient pressure Standardization must be adjusted if voltage deflections exceed width of paper	Improper reading

(TASK STATEMENT) OPERATE ELECTROCARDIOGRAPH

SCIENCE	MATH – NUMBER SYSTEMS
Function and operation of heart Conduction system of heart - cardiac waves Anatomy of chest and heart Characteristic electrical pattern Positions of chest leads Marking system code	Coding system to mark leads I . II .. III ... AVR .-. AVL .-.. AVF .-... V_1 -. V_2 -.. V_3 -... V_4 -.... V_5 -..... V_6 -.....

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Machine operating manual, graph	Comprehension, description of mechanism, terminology

(TASK STATEMENT) PERFORM FOLLOW-UP CARE OF PATIENT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Patient Towel Water	Remove cable cords Remove electrodes Wipe off jelly	Safety Clean off all jelly Hazard Jelly, although harmless and non-corrosive, is uncomfortable when left to dry on skin

DECISIONS	CUES	ERRORS
Determine if patient needs extra attention	Patient attitude Mental state	Depression Fear

(TASK STATEMENT) PERFORM FOLLOW-UP CARE OF PATIENT

SCIENCE	MATH – NUMBER SYSTEMS

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Reassure patient	Appropriate diction, clarity of expression, persuasion, gestures, poise

242

(TASK STATEMENT) PERFORM FOLLOW-UP CARE OF MACHINE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Electrocardiograph Water Towels Pen Cleansing powder	Turn off power Remove tracing from machine Label tracing Clean electrodes with hot water and dry well Unplug power cord Cover machine	Safety Remove jelly from electrodes completely Hazard Tarnish and corrosion
DECISIONS	**CUES**	**ERRORS**
Select cleaning procedure	Use cleansing powder on electrodes Never steel wool	Improper operation

(TASK STATEMENT) PERFORM FOLLOW-UP CARE OF MACHINE

SCIENCE	MATH – NUMBER SYSTEMS

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Viewing	Inspect machine for cleaning needs	Visual analysis, Detail/inference, Color discrimination

(TASK STATEMENT) MOUNT ELECTROCARDIOGRAM

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Properly labeled tracing Mounting folder	Select sections to be mounted Mount in appropriate spaces Label mounting folder with all essential information Include standardization in each lead	
DECISIONS	**CUES**	**ERRORS**
Include abnormal beats, but not artifacts		

(TASK STATEMENT) MOUNT ELECTROCARDIOGRAM

SCIENCE	MATH – NUMBER SYSTEMS
Marking system code Characteristic electrical pattern of beats Characteristics of artifacts	

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing	Label mounting folder name hospital number date room number time taken initials of technician doctor	Penmanship, spelling, accuracy, informational reports